Oakes Irrigation Research Site

Carrington Research Extension Center
North Dakota State University

Garrison Diversion Conservancy District

2013 ANNUAL REPORT

Blaine Schatz Director/Agronomist
Leonard Besemann Research Specialist
Heidi Eslinger Research Technician

Table of Contents Home page

In addition to the major sponsors: Garrison Diversion Conservancy District and North Dakota State University; we would like to acknowledge and thank the following people and companies for their support of the Oakes Irrigation Research Site.

Companies that have provided financial sponsorship, grants or gifts:

North Dakota Corn Growers Association

National Sclerotinia Initiative

Orthman Manufacturing, Inc.

James Valley Grain

AgVise Laboratories

H & K Farms

Wheat Growers

Domine Seed Farms

Syngenta

Companies and individuals that donated seed, chemicals, supplies or equipment:

BASF
Bayer CropScience
Dow AgroSciences
DuPont
Robert Titus
Norman Haak

Annual reports for 1996-2013 are available at www.ag.ndsu.nodak.edu/oakes/oakes.htm

Table of Contents Home page

TABLE OF CONTENTS

Table of Contents Home page

RESEARCH PROGRAM

Data on irrigated crop production have been collected for the past 44 years on approximately 20 acres at the Oakes Irrigation Research Site located on the Robert Titus farm. The site is located 4.5 miles south of Oakes adjacent to North Dakota State Highway 1. The objectives of these studies are:

1. Provide irrigators with information that results in efficient crop production.
2. Develop and refine Best Management Practices that are producer acceptable.
3. Promote irrigation development in North Dakota.
4. Determine alternate and specialty crops to be grown under irrigation in North Dakota and develop agronomic practices for their successful adaptation.

A cooperative agreement between North Dakota State University and the Garrison Diversion Conservancy District makes this research effort possible. The University provides technical staff; Leonard Besemann as research specialist and Heidi Eslinger as research technician. The Garrison Diversion Conservancy District provides most of the financial resources. North Dakota State University faculty and staff from the departments of Soil Science, Plant Science, Agricultural and Biosystems Engineering, Plant Pathology and the Agricultural Experiment Station participate in conducting experiments at the site.

WEATHER 2013

The winter of 2012 - 2013 began warmer-than-average with little snowfall until February. February, March and April saw greater snowfall amounts with a late snowstorm April 14-15 depositing about 20 inches of snow. No record low temperatures were recorded but were consistently five to ten degrees below the average temperatures for much of March and April which made spring planting later than average. The last frost in the spring was on May 18. The average monthly temperature for April was 11 degrees below the long-term average and October was three degrees below the long-term average. May through August, the temperature was near average while September was five degrees above the long-term average. The maximum temperature equaled or exceeded 90°F nineteen times; once in May, twice in June, three times in July, ten times in August and three times in September. The highest temperature was 97°F on August 20. Precipitation was below average in April and near average in May. June, September and October had above-normal precipitation with June recording 9.27 inches, which was double the long-term average. The mean daily temperatures were above average in August and September; near average in May, June, July and below average in April and October. The first frost was October 13 with the first hard frost ($\leq$ 28°F) October 16. All crops reached maturity before frost. Growing degree units in 2013 were above average.

Table of Contents Home page

Table 1. Precipitation and temperature at the Oakes Irrigation Research Site.

	Precipitation			Average daily temperatures		
Month	2013	15-year average	25-year average	2013	15-year average	25-year average
	----------inches----------			----------°F----------		
April	0.83	1.53	1.63	33	44	44
May	3.37	3.29	2.99	57	56	57
June	9.27	4.68	4.18	67	66	66
July	0.91	3.02	3.25	71	72	71
August	0.41	2.25	2.15	71	69	69
September	5.04	3.08	2.85	65	60	60
October	4.87	1.98	2.13	43	46	46

Table 2. Growing degree units[1] at the Oakes Irrigation Research Site.

Month	2013	10-year average	15-year average	25-year average
May	318	300	298	309
June	518	499	498	497
July	654	661	662	633
August	626	572	584	583
September	446	378	371	371
Total	2561	2410	2413	2394

[1]Growing degree units = $(Temp_{max} + Temp_{min})/2 - 50$. If $Temp_{max}$ is greater than 86, then $Temp_{max} = 86$. If $Temp_{min}$ is less than 50, then $Temp_{min} = 50$. Temperature is in degrees F.

Table 3. Dates of last and first frosts.

	2013	10-year average	15-year average	25-year average
Last frost in Spring				
32 °F or less	18-May	6-May	2-May	4-May
28 °F or less	18-May	26-Apr	26-Apr	27-Apr
First frost in Fall				
32 °F or less	13-Oct	5-Oct	3-Oct	30-Sep
28 °F or less	16-Oct	11-Oct	8-Oct	6-Oct
Frost free period (days)	148	154	155	150

Table of Contents Home page

Table 4. Irrigation water applied, 2013.

Study	Irrigation water applied
	inches
Dry edible bean trials	
Misc and navy bean	9.8
Pinto bean	9.7
Energy sugarbeet variety trial	12.8
Field corn hybrid performance trial	13.4
Field corn studies	
Fortix	13.7
KTS	13.4
Mosaic	13.4
Stoller	13.4
Onion hybrid performance trial	13.4
Onion weed control study	13.3
Optimum corn stover removal for biofuel	
corn on corn	13.9
corn on soybean	13.9
soybean on corn	13.9
Potato trials	13.3
Soybean variety performance trials	
conventional	12.2
Roundup Ready®	12.2
Stoller soybean	12.2
Strip-till	
corn on soybean	13.4
soybean on corn	12.1
corn on corn	14.0
Sunflower variety head rot study*	2.8
Sunflower head rot fungicide timing*	2.5

*Received additional irrigation via the misting system

Table of Contents Home page

Dry Edible Bean Variety Trials

L. Besemann and H. Eslinger

MATERIALS AND METHODS

Soil:	Pinto bean – Embden loam; soil N 40 lbs/acre. Navy and misc bean - Maddock sandy loam; soil N 48 lbs/acre.
Previous crop:	Pinto bean: 2012 – field corn. Navy and misc bean: 2012 – potato and onion.
Seedbed preparation:	Spring conventional tillage.
Planting:	May 31.
Plots:	Plots were 17 ft long by 7.5 ft (3 rows) wide. The study had four replications.
Fertilizer:	Broadcast 34 lbs N/acre, 81 lbs P_2O_5/acre, 103 lbs K_2O/acre and 19 lbs S/acre as 8-20-26-5 May 1.
Irrigation:	Overhead sprinkler irrigation as needed.
Pest control:	Trust (1 pt/acre) May 31, Basagran (1.5 pt/acre) + COC (1.25% v/v) June 26 and Raptor (4 oz/acre) + NIS (0.25% v/v) + AMS (1.5 lb/10 gal) July 5 for weed control. Proline (5 oz/acre) July 18, July 24 and August 1, T-Methyl (35 oz/acre) August 19 for disease control.
Harvest:	Hand harvested all bean varieties September 9. Harvest area for all bean varieties was seventeen feet of the middle row. Beans were threshed with a stationary plot thresher September 13.

Table of Contents Home page

Table 1. Edible Bean Variety Trial at the Oakes Irrigation Research Site in 2013.

Variety	Market Class	Day of Maturity[1]	Seeds/ Pound	Seed Weight	Test Weight	Seed Yield 2013	Seed Yield 2-yr. Avg.
		Julian Day		gms/100	lb/bu	----- lb/ac ------	
LaPaz	Pinto	242.3	1146	39.7	59.7	3440	3390
Lariat	Pinto	248.0	1151	39.5	57.6	3659	3535
Mariah	Pinto	243.5	1082	42.0	58.5	2925	--
Maverick	Pinto	242.8	1078	42.2	57.5	3206	3104
Medicine Hat	Pinto	239.5	1034	43.9	57.0	3385	2830
ND-307	Pinto	241.8	1063	42.7	55.8	3107	3182
Stampede	Pinto	242.3	1171	38.9	57.0	3020	2972
Windbreaker	Pinto	238.5	1040	43.7	57.8	3630	3378
Avalanche	Navy	240.3	2092	21.7	63.7	2513	2427
Ensign	Navy	238.5	1910	23.8	63.2	3137	2808
HMS Medalist	Navy	241.8	2419	18.8	63.7	3320	2762
Navigator	Navy	240.0	2088	21.8	63.2	2848	2551
Norstar	Navy	240.5	2268	20.0	65.0	2199	1886
T9905	Navy	240.5	1934	23.5	63.2	3883	3369
Vista	Navy	241.5	2211	20.6	63.7	3363	2845
Eclipse	Black	239.3	1964	23.1	61.3	3130	3447
Loreto	Black	240.0	2057	22.1	62.6	2880	--
Zorro	Black	240.8	1925	23.6	61.3	3278	3639
Merlot	Small Red	249.0	1215	37.4	58.0	2713	3392
Rio Rojo	Small Red	239.8	1265	35.9	64.8	3285	--
Sedona	Pink	243.5	1090	41.7	59.1	3226	3778
Hime		249.5	1640	27.9	63.5	2186	3073
	MEAN	242.0	1653	32.0	60.6	3116	--
	C.V. (%)	0.5	3.5	3.5	1.0	10.2	--
	LSD 0.10	1.5	64	1.3	0.7	374	--
	LSD 0.05	1.8	77	1.6	0.8	448	--

Planting Date = May 31

[1] Date of Maturity: Julian Day 242 = August 30.

Data includes only released varieties. Experimental lines are not included. Statistics reflect the entire trial.

Table of Contents Home page

Corn Hybrid Performance Trial

L. Besemann and H. Eslinger

Corn for grain commands the most irrigated acres of all crops in North Dakota. The fact that significant differences in the accumulation of growing degree units for corn and other weather-related issues exist across the state, it is vital that corn hybrids be tested in specific locations and regions. It is the goal of this trial to provide yield and other agronomic parameters for corn growers in southeastern North Dakota.

MATERIALS AND METHODS

Soil:	Maddock sandy loam; soil N 20 lbs/acre.
Previous crop:	2012 – soybean.
Seedbed preparation:	Spring conventional tillage.
Planting:	Planted May 14 in 30-inch rows. Thinned to 36,900 plants/acre.
Fertilizer:	Broadcast 34 lbs N/acre, 81 lbs P_2O_5/acre, 103 lbs K_2O/acre and 19 lbs S/acre as 8-20-26-5 May 1. Stream bar 60 lbs N/acre May 27 as 28-0-0. Sidedress 135 lbs N/acre June 18 and 60 lbs N/acre June 25 as 28-0-0.
Irrigation:	Overhead sprinkler irrigation as needed.
Pest Control:	Outlook (18 oz/acre) May 23, Laudis (3 oz/acre) + AAtrex 9-O (0.5 lb ai/acre) + Destiny (0.05% v/v) + AMS (1½ lbs/acre) June 11.
Harvest:	November 6 with a plot combine. Harvest area was two rows 17 feet long.

Table of Contents Home page

Table 1. Corn hybrid performance trial at the Oakes Irrigation Research Site in 2013.

Brand	Hybrid	R.M.	Hybrid Traits[1]	Silk Date	Ear Ht.	Plant Ht.	Lodge		Grain Protein	Content		Harvest Moist.	Test Wt.	Grain Yield	
							Root	Stalk		Starch	Oil			2013	2-yr Avg.
				July	inch	inch	--0 to 9--		%	%	%	%	lb/bu	--bu/ac--	
AgVenture	RL4492HBW	92	RRBTRW	23.5	43.0	90.7	0.5	0.8	9.3	73.1	3.1	19.8	54.5	220.2	--
AgVenture	RL4616HBW	94	RRBTRW	23.8	46.0	95.6	0.3	0.5	8.9	72.5	3.4	18.7	54.4	224.4	--
AgVenture	RL5671HBW	98	RRBTRW	25.8	44.9	95.0	0.0	0.3	8.5	72.5	3.7	21.9	51.8	257.2	--
AgVenture	RL5718HBW		RRBTRW	24.5	42.8	94.7	0.3	0.0	8.8	72.9	3.3	19.6	54.0	232.3	--
Channel	199-29	99	STXRIB	27.0	46.1	97.1	0.3	0.0	8.8	72.3	3.6	21.0	52.7	240.5	250.2
Dairyland	DS-9791RA	91	DAS SMARTSTAX	25.5	39.7	91.8	0.0	1.0	8.8	73.4	3.0	17.7	53.8	208.9	--
Dairyland	DS-9694SSX	94	DAS SMARTSTAX	25.5	42.2	93.8	0.5	1.3	9.1	73.8	2.7	16.3	53.0	204.3	--
Dairyland	DS-9494RA	94	DAS SMARTSTAX	27.5	48.4	99.7	2.8	0.0	8.9	72.9	3.5	20.2	53.5	213.9	--
Dairyland	DS-9796	96	3000GT	25.0	42.6	94.7	0.3	0.3	9.5	72.4	3.5	18.7	53.2	228.0	--
Dairyland	DS-9898RA	98	DAS SMARTSTAX	28.0	46.8	96.1	1.0	1.3	9.0	72.1	4.0	21.7	52.0	237.2	--
Dairyland	DS-1803	98	CONVENTIONAL	25.5	40.9	87.4	0.0	0.8	8.4	72.7	3.6	18.5	52.3	215.0	250.6
Dairyland	DS-9501SSX	101	DAS SMARTSTAX	27.0	43.1	93.6	3.0	0.0	8.9	73.2	3.2	20.4	53.0	219.5	--
Dekalb	DKC43-10	93	VT2PRO	24.5	44.9	94.9	0.5	0.8	8.7	73.4	3.0	17.0	54.3	213.9	--
Dekalb	DKC46-20	96	VT3PRO	24.8	42.6	93.8	1.8	0.0	9.0	73.4	2.9	17.3	56.5	213.8	229.2
Dekalb	DKC49-29	99	GENSS	26.3	43.4	95.3	0.8	0.0	8.9	72.8	3.3	20.1	54.5	229.5	--
Dyna-Gro	D35VP40	95	VT3P	23.8	43.3	94.3	0.8	0.0	8.7	73.4	3.0	15.9	53.1	231.9	245.3
Dyna-Gro	D37SS71	97	SS	25.5	47.8	100.7	2.3	0.0	9.3	72.5	3.3	20.7	53.2	216.9	248.3
Dyna-Gro	D39SS17	99	SS	28.0	44.3	96.7	0.3	0.0	8.8	72.6	3.4	22.5	52.2	229.6	--
Gold Country Seed	95-33 GEN VT3P		RR/VT3/RIB	25.0	46.0	99.8	1.0	0.3	8.9	73.0	3.2	17.7	55.3	237.9	--
Gold Country Seed	93-07RSS		RR/VT3/RIB/SS	24.3	42.1	91.9	0.3	0.0	9.0	72.9	3.3	16.4	54.9	235.9	--
Integra	9455		VT2PRO	24.0	43.5	95.7	0.3	0.0	8.7	73.4	3.1	14.9	53.7	222.8	248.0
			MEAN	25.0	44.8	95.4	0.6	0.3	8.9	72.9	3.2	19.0	54.0	226.7	--
			C.V. (%)	2.3	5.2	3.0	178	254	2.8	0.6	5.8	5.1	1.3	6.5	--
			LSD 0.10	0.7	2.7	3.3	1.3	0.8	0.3	0.5	0.2	1.1	0.8	17.0	--
			LSD 0.05	0.8	3.2	3.9	1.5	1.0	0.3	0.6	0.3	1.3	1.0	20.3	--

Planting Date = May 14; Harvest Date = November 6; Previous Crop = Soybean

Table of Contents Home page

Table 1. Corn hybrid performance trial at the Oakes Irrigation Research Site in 2013.

Brand	Hybrid	R.M.	Hybrid Traits[1]	Silk Date	Ear Ht.	Plant Ht.	Lodge		Grain Protein	Content		Harvest Moist.	Test Wt.	Grain Yield	
							Root	Stalk		Starch	Oil			2013	2-yr Avg.
				July	inch	inch	--0 to 9--		%	%	%	%	lb/bu	--bu/ac--	
Nuseed	9001 VP3220	90	Viptera 3220	24.8	50.8	98.8	2.3	0.8	9.6	73.0	2.9	15.3	53.3	230.6	--
Nuseed	9202 VT2P	92	VT Double Pro	24.0	43.0	95.3	0.3	0.5	8.9	73.1	3.4	16.0	54.3	217.7	--
Nuseed	9503 VT2P	95	VT Double Pro	24.0	40.5	92.7	0.0	2.0	8.7	72.9	3.3	17.9	53.7	201.5	--
Nuseed	9504 VT3P	95	VT Triple Pro	22.8	41.6	92.4	0.0	0.0	9.1	73.4	3.1	18.2	54.8	202.8	--
NuTech	5N-9404	94	GT/CB/LL/RW	25.0	48.8	104.1	0.3	0.8	9.5	72.6	3.3	16.9	54.5	232.3	--
NuTech	5V-792	94	GT/CB/LL/RW/BL	23.8	45.9	91.0	1.8	0.3	9.2	72.8	3.4	19.5	54.8	203.1	--
NuTech	5N-9802	98	GT/CB/LL/RW	26.0	48.3	100.3	0.5	0.0	9.1	73.1	3.2	20.9	53.3	226.9	--
NuTech/G2 Genetics	5X-894	94	HXT/RR2/LL	24.0	44.4	91.6	0.0	0.8	8.8	72.8	3.2	18.1	54.5	213.0	--
NuTech/G2 Genetics	5X-795	95	HXT/RR2/LL	23.5	50.1	95.4	1.0	0.0	9.0	73.1	3.1	19.2	55.2	214.9	--
NuTech/G2 Genetics	5Z-9605	96	YGCB/HX1/RR2/LL	21.0	45.7	92.9	0.0	0.8	9.7	72.5	3.3	19.4	54.2	223.9	--
NuTech/G2 Genetics	3F-198	98	YGCB/HX1/RR2	25.3	47.6	100.7	1.5	0.0	8.7	72.4	3.5	19.2	51.5	258.9	264.5
NuTech/G2 Genetics	5X-698	98	HXT/RR2/LL	24.3	47.8	94.1	0.0	0.0	8.9	72.5	3.3	20.7	54.9	238.1	--
NuTech/G2 Genetics	5H-399	99	HX1/RR2/LL	26.5	47.4	96.6	0.5	0.0	8.4	72.5	3.6	21.4	51.1	258.2	283.9
NuTech/G2 Genetics	5Z-200	100	YGCB/HX1/RR2/LL	25.3	46.6	94.8	0.5	1.3	9.5	72.0	3.5	21.4	52.2	234.2	--
PFS	76S92	92	GENVT2P	25.0	45.7	95.0	0.8	0.0	8.5	73.2	3.3	18.2	55.0	237.7	--
PFS	55S96	96	GENVT3P	25.5	38.6	89.4	0.3	0.0	8.8	73.0	3.1	18.1	55.1	223.4	246.6
PFS	88A97	97	GENSS	25.5	47.3	97.3	0.0	0.5	8.9	73.0	3.1	21.1	52.9	242.0	--
Proseed	990 GT3000	90	3000GT	24.3	49.4	97.6	1.5	1.0	9.4	73.1	3.0	14.7	53.5	215.8	--
Proseed	1295 SS	95	SS	25.0	44.5	97.5	1.3	0.3	8.9	73.0	3.3	21.7	54.0	239.7	--
Proseed	PX 96 SSG	96	SS	23.5	37.8	91.0	0.5	0.3	8.6	73.2	3.2	15.9	54.2	211.2	--
Proseed	PX 97 SSR	97	SS	26.5	47.9	100.1	0.0	0.0	9.0	73.0	3.2	19.8	54.7	242.5	--
			MEAN	25.0	44.8	95.4	0.6	0.3	8.9	72.9	3.2	19.0	54.0	226.7	--
			C.V. (%)	2.3	5.2	3.0	178	254	2.8	0.6	5.8	5.1	1.3	6.5	--
			LSD 0.10	0.7	2.7	3.3	1.3	0.8	0.3	0.5	0.2	1.1	0.8	17.0	--
			LSD 0.05	0.8	3.2	3.9	1.5	1.0	0.3	0.6	0.3	1.3	1.0	20.3	--

Planting Date = May 14; Harvest Date = November 6; Previous Crop = Soybean

Table of Contents Home page

Table 1. Corn hybrid performance trial at the Oakes Irrigation Research Site in 2013.

Brand	Hybrid	R.M.	Hybrid Traits[1]	Silk Date	Ear Ht.	Plant Ht.	Lodge		Grain Protein	Content		Harvest Moist.	Test Wt.	Grain Yield	
							Root	Stalk		Starch	Oil			2013	2-yr Avg.
				July	inch	inch	--0 to 9--		%	%	%	%	lb/bu	--bu/ac--	
Rea Hybrids	3A921-RIB	92	GenSS-RIB	26.3	50.0	101.1	3.0	0.0	9.0	73.2	3.1	19.1	54.6	215.7	--
Rea Hybrids	3A929-RIB	92	VT2P-RIB	24.3	43.9	95.3	1.3	0.0	9.0	73.3	3.1	18.9	55.5	231.8	--
Rea Hybrids	4B285-RIB	93	VT2P-RIB	23.3	43.1	92.5	0.0	0.3	8.6	73.6	2.9	17.4	53.8	215.3	--
Rea Hybrids	4B941-RIB	94	VT2P-RIB	25.3	44.1	96.4	1.0	0.0	8.8	73.3	3.1	18.4	54.9	223.4	--
Rea Hybrids	4A950-RIB	95	GenSS-RIB	25.5	50.1	98.8	0.8	0.0	9.3	73.3	3.0	20.0	55.9	217.6	--
Rea Hybrids	4A654-RIB	96	GenSS-RIB	24.5	42.1	93.8	0.0	0.0	8.9	73.3	3.0	19.4	54.4	213.5	--
Rea Hybrids	4A971-RIB	97	GenSS-RIB	24.8	45.1	97.3	0.0	0.0	9.0	73.1	3.0	19.1	54.7	232.0	--
Rea Hybrids	5A980-RIB	98	GenSS-RIB	25.0	43.3	94.4	0.0	0.0	9.5	72.4	3.4	20.1	56.1	226.4	--
Renk	RK522SSTX	94	SSTX	24.3	46.3	98.2	0.5	0.5	8.8	72.8	3.4	19.3	53.0	240.9	--
Renk	RK557SSTX	95	SSTX	25.5	45.6	98.4	0.3	0.0	9.0	73.1	2.9	21.3	54.0	234.4	--
Renk	RK568VT3P	95	VT3P	25.0	42.8	93.1	0.0	0.0	8.9	73.0	3.2	18.7	55.0	234.4	234.4
Thunder	7993 VT2P RIB	92	VT2P RIB	25.3	43.4	94.4	0.3	0.0	8.6	73.2	3.3	18.7	55.0	225.4	--
Thunder	7396VT2P RIB	96	VT2 RIB	25.0	47.3	94.7	0.0	0.0	9.4	72.8	3.2	17.1	53.2	243.1	--
Thunder	103-97SS	97	SMART STAX	25.8	46.5	98.6	0.0	0.3	8.9	73.2	3.1	18.7	54.4	236.3	--
Wensman	W 7140VT3PRIB	93	VT3PRIB	23.0	40.1	96.4	0.0	0.0	8.9	73.1	3.3	19.2	55.6	220.5	--
Wensman	W 70975VT3PRO	95	VT3PRP	24.8	41.4	92.7	0.3	0.0	8.9	73.3	3.1	17.5	55.7	216.1	--
Wensman	W 8184VT2RIB	95	VT3PRP	25.5	42.5	93.5	0.3	0.0	9.0	73.1	3.0	19.2	54.9	215.7	--
Wensman	W 90967STX	96	STX	24.5	43.8	93.1	0.0	0.0	9.1	73.2	3.0	19.7	54.4	212.8	--
Wensman	W 9288STXRIB	98	STXRIB	26.0	46.1	96.4	0.0	0.0	8.6	72.5	3.6	21.8	52.4	248.7	248.7
Wensman	W 7290VT3PRIB	99	VT3PRIB	25.3	43.1	95.7	1.0	0.0	8.6	73.0	3.3	21.0	53.9	243.8	--
Wensman	W 7320VT3PRIB	101	VT3PRIB	25.3	47.3	94.1	0.8	0.5	9.0	72.2	3.7	22.9	53.5	235.4	235.4
			MEAN	25.0	44.8	95.4	0.6	0.3	8.9	72.9	3.2	19.0	54.0	226.7	--
			C.V. (%)	2.3	5.2	3.0	178	254	2.8	0.6	5.8	5.1	1.3	6.5	--
			LSD 0.10	0.7	2.7	3.3	1.3	0.8	0.3	0.5	0.2	1.1	0.8	17.0	--
			LSD 0.05	0.8	3.2	3.9	1.5	1.0	0.3	0.6	0.3	1.3	1.0	20.3	--

Planting Date = May 14; Harvest Date = November 6; Previous Crop = Soybean

[1] Hybrid traits as reported by seed company when hybrids submitted for evaluation.

* Four (4) replications were utilized to record each of the traits reported.

Table of Contents Home page

Corn Hybrid Performance Trial – Dryland

A dryland corn hybrid performance trial was initiated in 2011 to provide information for corn producers in southeast and south central North Dakota. This study is conducted on Barnes-Svea soils that dominate the dryland farming in the area.

MATERIALS AND METHODS

Soil:	Barnes-Svea; soil N 20 lbs/acre.
Previous crop:	2012 – soybean.
Seedbed preparation:	Spring conventional tillage.
Planting:	Planted May 10 in 30-inch rows. Thinned to 32,800 plants/acre.
Fertilizer:	Broadcast 17 lbs N/acre, 74 lbs P_2O_5/acre and 60 lbs K_2O/acre as 7-31-25 November 2012. Broadcast 124 lbs N/acre, 21 lbs P_2O_5/acre and 18 lbs K_2O/acre as 38-6-5 May 6. Sidedress 85 lbs N/acre June 19 as 28-0-0.
Pest control:	Harness (2 pt/acre) May 24, Laudis (3 oz/acre) + AAtrex 9-O (0.5 lb ai/acre) + Destiny (0.05% v/v) + AMS (1½ lbs/acre) June 19.
Harvest:	November 5 with a plot combine. Harvest area was two rows 17 feet long.

RESULTS

Overall yields were lower than anticipated, mainly due to weather conditions. Favorable moisture after planting and emergence was followed by two months of little precipitation putting most hybrids under stress at silking. Wind of about 45 MPH further reduced yield in hybrids that were susceptible to stalk and root lodging.

Table of Contents Home page

Table 2. Corn hybrid performance trial (dryland) at Dickey County Fullerton, ND - Oakes Irrigation Research Site in 2013.

Brand	Hybrid	R.M.	Hybrid Traits[1]	Jday of Silk[2]	Ear Ht.	Plant Ht.	Lodge		Grain Protein	Content		Harvest Moist.	Test Wt.	Grain Yield		
							Root	Stalk		Starch	Oil			2013	2-yr Avg.	3-yr Avg.
					inch	inch	--0 to 9--		%	%	%	%	lb/bu	-------bu/ac-------		
Channel	192-08	92	VT2PRIB	210.0	40.6	76.3	0.8	0.8	12.1	72.1	2.5	15.9	53.5	86.7	--	--
Channel	193-34	93	VT2PRIB	208.5	41.4	80.3	0.0	1.0	11.0	72.7	2.8	15.8	55.5	98.6	--	--
Channel	196-06	96	VT3P	210.8	33.9	65.8	0.3	0.0	11.9	72.7	2.3	16.8	51.2	82.4	100.5	120.5
Channel	199-29	99	STXRIB	213.8	38.4	70.7	2.3	0.5	10.9	72.6	2.7	19.1	52.1	91.7	--	--
Dairyland	DS-9791RA	91	DAS SMARTSTAX	213.8	38.1	72.4	0.5	0.3	11.3	72.2	2.9	18.3	54.4	79.1	--	--
Dairyland	DS-9694SSX	94	DAS SMARTSTAX	213.5	38.8	71.4	2.8	0.0	11.2	72.9	2.5	19.2	53.8	78.8	--	--
Dairyland	DS-9796	96	3000GT	214.5	38.2	73.8	0.3	0.0	12.8	71.2	3.0	20.8	53.2	79.5	--	--
Dairyland	DS-9898RA	98	DAS SMARTSTAX	215.0	43.4	77.4	2.0	0.5	10.9	71.4	3.9	25.5	51.1	74.7	--	--
Dyna-Gro	D35VP40	95	VT3P	207.3	38.3	71.9	0.0	0.3	12.3	72.6	2.0	12.9	50.9	91.4	106.4	--
Dyna-Gro	D37SS71	97	SS	212.0	38.3	77.1	0.8	0.3	11.9	72.1	2.6	17.8	53.0	71.4	98.6	--
Dyna-Gro	D39SS17	99	SS	213.8	39.4	73.2	0.0	4.3	10.9	72.8	2.5	23.3	49.4	86.6	--	--
Funk's Frontiersman	090-R4	90	3000GT	211.5	42.6	76.1	1.0	0.0	11.9	72.6	2.1	13.6	52.1	82.1	--	--
Funk's Frontiersman	091-E3	91	VT3P RIB	206.3	37.3	71.8	0.0	1.0	11.6	73.1	2.0	15.2	54.6	94.7	--	--
Funk's Frontiersman	091-C3	91	VT2P RIB	206.8	34.6	70.7	0.0	2.3	12.2	72.0	2.4	14.6	51.9	88.1	--	--
Hyland Seeds	8315RA	92	SSX-RA	212.5	38.4	76.3	1.0	0.5	11.5	72.4	2.7	16.8	54.0	82.4	--	--
Hyland Seeds	4398	96	3000GT	212.8	40.5	75.4	1.3	0.3	12.8	71.8	2.5	17.4	53.9	82.8	--	--
Hyland Seeds	8450RA	98	SSX-RA	215.0	40.8	74.1	3.0	0.0	11.0	71.7	3.7	25.2	51.3	80.0	--	--
Integra	9455		VT2PRO	206.8	38.2	72.4	0.0	0.8	11.7	72.5	2.2	12.8	51.1	90.9	--	--
			MEAN	211.0	38.7	73.4	0.7	0.8	11.8	72.3	2.5	17.2	52.7	86.4	--	--
			C.V. (%)	4.2	6.8	5.8	158	158	2.8	0.4	8.5	10.1	1.6	16.4	--	--
			LSD 0.10	1.5	3.1	4.9	1.3	1.4	0.4	0.38	0.2	2.0	1.0	16.4	--	--
			LSD 0.05	1.7	3.7	5.9	1.5	1.7	0.5	0.44	0.3	2.4	1.1	19.6	--	--

Planting Date = May 10; Harvest Date = November 5; Previous Crop = Soybean

Table of Contents Home page

Table 2. Corn hybrid performance trial (dryland) at Dickey County Fullerton, ND - Oakes Irrigation Research Site in 2013.

Brand	Hybrid	R.M.	Hybrid Traits[1]	Jday of Silk[2]	Ear Ht.	Plant Ht.	Lodge		Grain Protein	Content		Harvest Moist.	Test Wt.	Grain Yield		
							Root	Stalk		Starch	Oil			2013	2-yr Avg.	3-yr Avg.
					inch	inch	--0 to 9--		%	%	%	%	lb/bu	-------bu/ac-------		
Legend Seeds	LR 9090	90	VIP3110	213.5	41.2	72.7	4.0	0.0	12.0	72.4	2.2	17.1	51.8	73.7	--	--
Legend Seeds	LR 9391	91	GENSS	209.5	38.9	74.0	0.0	1.3	12.2	72.1	2.4	16.2	52.0	81.4	--	--
Legend Seeds	40J392	92	VT2PRIB	209.5	38.5	76.9	0.0	0.5	12.4	72.3	2.2	14.0	52.7	81.4	101.1	--
Legend Seeds	LR 9495	95	VT3PRIB	211.3	36.8	71.2	0.0	0.3	12.6	71.8	2.4	19.2	54.4	83.0	--	--
Legend Seeds	LR 9397	97	VT2PRIB	206.8	36.3	75.1	0.0	0.3	11.9	72.7	2.4	15.6	52.9	101.5	--	--
Mustang	3291	91	VT2P	207.5	40.7	76.6	0.0	2.8	11.8	72.6	2.4	15.6	53.4	93.5	--	--
Mustang	3893	93	GEN SS	208.0	40.9	77.5	0.8	2.0	12.2	72.9	2.0	14.4	54.1	91.4	--	--
Mustang	4695	95	VT3P	211.8	35.5	67.5	0.0	0.3	12.1	72.1	2.4	18.1	54.4	84.0	--	--
Mycogen Seeds	X12403GM	96	GT3000	214.5	40.7	75.4	0.0	0.0	12.9	71.1	3.1	21.1	52.9	68.9	--	--
Mycogen Seeds	2H456	97	VT3	210.3	40.7	74.1	1.8	0.0	12.0	72.6	2.3	17.7	52.8	93.6	--	--
Mycogen Seeds	2Y479	98	SSX/RA	215.0	41.8	76.9	1.8	0.0	11.0	71.3	3.9	25.0	52.1	76.1	--	--
Northstar Genetics	Viking VS86-536	86	VT2PRIB	205.0	33.6	73.3	0.0	0.0	12.0	72.0	2.7	13.1	56.1	94.4	--	--
Northstar Genetics	Viking VS88-116	88	VT2PRIB	208.0	42.3	80.9	0.3	2.0	12.8	71.4	2.7	14.4	55.0	88.8	--	--
Northstar Genetics	Viking VS90-590	90	VT2PRIB	207.5	34.4	72.5	0.0	2.0	11.9	72.2	2.4	14.2	51.3	91.5	--	--
Nuseed	9001 VP3220	90	Viptera 3220	214.0	43.7	74.6	4.0	0.0	11.8	72.6	2.2	17.9	52.5	78.9	--	--
Nuseed	9202 VT2P	92	VT Double Pro	209.3	36.1	74.8	0.0	0.8	12.1	72.4	2.3	13.4	52.0	89.4	--	--
Nuseed	9503 VT2P	95	VT Double Pro	210.0	37.6	76.5	0.0	1.8	11.3	73.0	2.2	15.6	53.5	87.7	--	--
Nuseed	9504 VT3P	95	VT Triple Pro	206.0	35.0	71.6	0.0	0.0	11.8	72.8	2.4	15.9	52.7	96.0	--	--
NuTech	5N-9404	94	GT/CB/LL/RW	212.0	42.3	77.8	1.0	0.0	12.7	71.7	2.5	17.7	53.3	77.3	--	--
NuTech	5N-9802	98	GT/CB/LL/RW	213.3	43.0	75.3	0.8	1.3	11.1	72.5	2.7	21.2	49.8	90.2	--	--
			MEAN	211.0	38.7	73.4	0.7	0.8	11.8	72.3	2.5	17.2	52.7	86.4	--	--
			C.V. (%)	4.2	6.8	5.8	158	158	2.8	0.4	8.5	10.1	1.6	16.4	--	--
			LSD 0.10	1.5	3.1	4.9	1.3	1.4	0.4	0.38	0.2	2.0	1.0	16.4	--	--
			LSD 0.05	1.7	3.7	5.9	1.5	1.7	0.5	0.44	0.3	2.4	1.1	19.6	--	--

Planting Date = May 10; Harvest Date = November 5; Previous Crop = Soybean

Table of Contents Home page

Table 2. Corn hybrid performance trial (dryland) at Dickey County Fullerton, ND - Oakes Irrigation Research Site in 2013.

Brand	Hybrid	R.M.	Hybrid Traits[1]	Jday of Silk[2]	Ear Ht.	Plant Ht.	Lodge Root	Lodge Stalk	Grain Protein	Content Starch	Content Oil	Harvest Moist.	Test Wt.	Grain Yield 2013	Grain Yield 2-yr Avg.	Grain Yield 3-yr Avg.
					inch	inch	--0 to 9--		%	%	%	%	lb/bu	-------bu/ac-------		
NuTech/G2 Genetics	5X-894	94	HXT/RR2/LL	209.8	37.9	70.9	0.5	0.5	12.0	72.3	2.0	14.8	52.0	86.5	--	--
NuTech/G2 Genetics	5X-795	95	HXT/RR2/LL	210.0	43.6	74.4	1.3	2.0	12.1	72.5	2.0	19.6	50.7	71.9	110.2	125.1
NuTech/G2 Genetics	5Z-9605	96	YGCB/HX1/RR2/LL	206.5	37.4	68.4	0.0	0.0	12.6	71.8	2.2	16.7	51.6	92.9	--	--
NuTech/G2 Genetics	3F-198	98	YGCB/HX1/RR2	213.3	39.7	74.3	2.5	0.0	11.7	71.6	3.0	19.2	49.7	87.5	117.5	--
NuTech/G2 Genetics	5X-698	98	HXT/RR2/LL	212.0	40.9	75.9	0.8	0.0	11.6	71.8	2.6	20.8	52.9	88.3	--	--
NuTech/G2 Genetics	5H-399	99	HX1/RR2/LL	214.5	38.9	71.3	2.3	0.0	11.2	72.1	3.1	21.6	51.6	84.6	111.7	--
NuTech/G2 Genetics	5Z-200	100	YGCB/HX1/RR2/LL	213.8	38.6	67.9	0.0	0.3	12.6	71.8	2.3	21.5	51.4	77.6	--	--
PFS	76S92	92	GENVT2P	212.0	38.6	68.6	0.0	0.5	11.4	72.6	2.5	16.9	52.8	75.0	126.1	--
PFS	55S96	96	GENVT3P	211.8	34.9	66.4	0.0	0.5	12.2	72.0	2.4	17.7	54.6	92.8	119.3	--
PFS	88A97	97	GENSS	212.8	40.6	75.6	0.0	1.5	11.8	72.8	1.8	18.1	51.5	92.0	--	--
Proseed	990 GT3000	90	3000GT	211.0	43.0	77.6	3.3	0.0	12.1	72.7	2.2	14.6	51.7	96.5	--	--
Proseed	1295 SS	95	SS	212.3	38.1	70.6	2.0	0.8	10.8	72.2	3.0	22.8	52.1	78.2	109.7	--
Proseed	PX 96 SSG	96	SS	211.0	33.6	70.8	0.0	1.8	11.3	72.8	2.4	16.5	53.2	80.6	--	--
Proseed	PX 97 SSR	97	SS	214.5	41.1	73.5	0.0	1.8	12.4	72.7	2.0	16.9	53.1	66.4	--	--
Rea Hybrids	3A921-RIB	92	GenSS-RIB	213.8	36.8	72.1	2.8	4.0	11.9	72.5	2.2	15.5	52.5	70.9	107.1	--
Rea Hybrids	3A929-RIB	92	VT2P-RIB	210.5	38.3	70.8	0.3	0.0	12.2	72.1	2.6	15.4	54.2	89.6	105.0	--
Rea Hybrids	4B285-RIB	93	VT2P-RIB	208.5	36.3	72.1	0.3	2.0	11.7	72.8	2.2	14.5	51.5	85.2	114.7	134.9
			MEAN	211.0	38.7	73.4	0.7	0.8	11.8	72.3	2.5	17.2	52.7	86.4	--	--
			C.V. (%)	4.2	6.8	5.8	158	158	2.8	0.4	8.5	10.1	1.6	16.4	--	--
			LSD 0.10	1.5	3.1	4.9	1.3	1.4	0.4	0.38	0.2	2.0	1.0	16.4	--	--
			LSD 0.05	1.7	3.7	5.9	1.5	1.7	0.5	0.44	0.3	2.4	1.1	19.6	--	--

Planting Date = May 10; Harvest Date = November 5; Previous Crop = Soybean

Table of Contents Home page

Table 2. Corn hybrid performance trial (dryland) at Dickey County Fullerton, ND - Oakes Irrigation Research Site in 2013.

Brand	Hybrid	R.M.	Hybrid Traits[1]	Jday of Silk[2]	Ear Ht.	Plant Ht.	Lodge		Grain	Content		Harvest Moist.	Test Wt.	Grain Yield		
							Root	Stalk		Starch	Oil			2013	2-yr Avg.	3-yr Avg.
					inch	inch	--0 to 9--		%	%	%	%	lb/bu	-------bu/ac-------		
Rea Hybrids	4B941-RIB	94	VT2P-RIB	211.0	39.3	72.8	1.3	0.5	11.5	72.4	2.7	16.6	55.5	98.2	123.4	--
Rea Hybrids	4A950-RIB	95	GenSS-RIB	211.3	42.3	76.1	0.5	0.3	12.4	72.3	2.3	17.5	54.5	88.2	105.3	--
Rea Hybrids	4A654-RIB	96	GenSS-RIB	210.0	35.3	70.8	0.3	0.0	12.2	72.7	2.1	15.4	52.9	89.6	115.5	--
Rea Hybrids	4A971-RIB	97	GenSS-RIB	210.5	37.7	73.1	0.0	1.0	11.8	73.1	1.7	15.8	51.0	95.4	--	--
Rea Hybrids	5A980-RIB	98	GenSS-RIB	211.5	38.6	72.6	0.3	0.0	12.1	72.5	2.4	16.1	55.3	98.7	--	--
Renk	RK522SSTX	94	SSTX	211.0	37.5	71.6	0.5	1.5	11.5	73.1	2.2	14.4	52.5	92.2	--	--
Renk	RK557SSTX	95	SSTX	211.5	39.6	75.2	0.0	2.3	12.2	72.9	1.7	19.5	51.1	83.7	--	--
Renk	RK568VT3P	95	VT3P	212.8	33.8	66.0	0.3	0.5	12.0	71.9	2.5	17.5	53.9	87.8	110.1	--
Thunder	7993 VT2P RIB	92	VT2P RIB	212.5	37.2	67.6	0.0	1.3	11.3	72.3	2.7	17.1	52.3	80.2	--	--
Thunder	7396VT2P RIB	96	VT2 RIB	211.3	39.1	75.8	0.0	0.0	11.7	72.6	2.4	16.0	51.6	96.7	--	--
Thunder	103-97SS	97	SMART STAX	214.0	38.3	71.3	0.0	0.0	12.0	72.8	2.1	16.1	52.4	75.0	--	--
Wensman	W 8120VT2RIB	92	VT2RIB	209.3	38.3	79.6	0.3	1.5	11.9	72.2	2.4	13.3	52.3	92.6	125.8	142.9
Wensman	W 90935VT3PRO	93	VT3PRO	206.5	39.6	74.8	0.5	2.0	12.4	72.3	2.2	12.7	52.6	89.6	--	--
Wensman	W 7140VT3PRIB	93	VT3PRIB	208.0	35.9	75.8	0.3	0.3	11.1	72.8	2.7	16.4	54.9	99.4	133.2	144.9
Wensman	W8184VT2PRO	95	VT3PRP	211.8	36.4	67.9	0.0	0.8	12.3	71.9	2.4	18.1	53.9	81.3	103.7	--
Wensman	W 7268VT3PRIB	96	VT3PRIB	213.0	39.9	76.6	0.0	0.0	11.1	72.1	2.9	19.5	53.5	99.5	120.2	135.0
Wensman	W 90967STX	96	STX	208.3	39.5	75.5	1.0	0.0	12.3	72.4	2.1	15.0	53.2	89.8	--	--
Wensman	W 9288STXRIB	98	STXRIB	213.0	38.1	70.8	1.0	0.5	10.8	72.6	2.7	20.3	51.8	88.7	125.1	--
Wensman	W 7290VT3PRIB	99	VT3PRIB	212.0	38.7	74.7	0.5	1.0	11.4	72.8	2.4	17.8	52.2	102.3	119.3	131.2
			MEAN	211.0	38.7	73.4	0.7	0.8	11.8	72.3	2.5	17.2	52.7	86.4	--	--
			C.V. (%)	4.2	6.8	5.8	158	158	2.8	0.4	8.5	10.1	1.6	16.4	--	--
			LSD 0.10	1.5	3.1	4.9	1.3	1.4	0.4	0.38	0.2	2.0	1.0	16.4	--	--
			LSD 0.05	1.7	3.7	5.9	1.5	1.7	0.5	0.44	0.3	2.4	1.1	19.6	--	--

Planting Date = May 10; Harvest Date = November 5; Previous Crop = Soybean

[1] Hybrid traits as reported by seed company when hybrids submitted for evaluation.

[2] Jday of Silk: Julian day of year when hybrids reached 50% silk.
Example: Jday 206 = July 25, Jday 211 = July 30, Jday 214 = August 2.

Four (4) replications were utilized to record each of the traits reported.

Table of Contents Home page

Onion Hybrid Performance Trial

L. Besemann and H. Eslinger

Onions have done well under irrigation in North Dakota. Yellow sweet Spanish is the predominate type grown. This study tested 13 sweet Spanish hybrids.

MATERIALS AND METHODS

Soil:	Hecla sandy loam and Maddock sandy loam; soil N 24 lbs/acre.
Previous crops:	2012 – soybean.
Seedbed preparation:	Spring conventional tillage.
Planting:	Direct seeded onions (285,000 seeds/acre) May 8 with a Monosem precision planter. Onions were planted 2 lines per row with 2.5 inches between lines and rows on 16-inch centers.
Plots:	Plots were 3 ft (two rows) wide by 17 ft long. The study had four replications.
Fertilizer:	Broadcast 34 lbs N/acre, 81 lbs P_2O_5/acre, 103 lbs K_2O/acre and 19 lbs S/acre as 8-20-26-5 May 2. Stream bar 30 lbs N/acre June 11, June 27, July 10 and July 24 as 28-0-0.
Irrigation:	Overhead sprinkler irrigation as needed.
Pest control:	Trust (1 pt/acre) May 8, Moxy 2E (2 oz/acre) June 5 and June 13, Moxy (1 pt/acre) + Goal 2XL (0.6 pt/acre) June 26, Section (8 oz/acre) + COC (1.00% v/v) July 5 and hand weeding for weed control.
Harvest:	Pulled all onions October 1 before any hybrids reached half down. Onions were topped and bagged and put in a dryer to cure. Onions were graded October 14, October 15 and October 16.

RESULTS

Yields were considerably lower for the 2013 season for all varieties. Planting was 2-3 weeks later than normal and initial stands were lower than usual. When the onions were at about the one to one and half leaf stage they received approximately 5.5 inches of rainfall with some hail, within three hours. This appeared to have set the onions back so that even with favorable weather and irrigation the onions did not recover. The onions were pulled October 1, even though none had reached half down. Most varieties had a high number of culls (bottle necked, soft and growing).

Table of Contents Home page

Table 1. Onion hybrid performance trial at the Oakes Irrigation Research Site in 2013.

Hybrid	Seed[1] Source	Maturity[2] Days	>4"	3 to 4"	2¼ to 3	1 to 2¼	Single Center	Marketable Yield	Marketable Bulbs	Doubles	Culls	Total Culls	Total Yield	Total Bulbs
			----------cwt----------				%	cwt	/ac	----------cwt----------				/ac
Cruiser	HZ	113	0	66	86	67	40	220	91531	6	34	41	261	113152
Ventura	HZ	113	34	210	152	61	85	458	119639	14	33	47	506	136936
Maverick	HZ	120	39	172	54	13	70	278	53093	34	91	125	403	95615
Frontino	HZ	125	31	124	23	2	75	181	28348	34	115	148	329	79519
Patterson	BE	105	2	55	76	54	50	187	76636	14	30	44	231	92492
Hamilton	BE	118	33	155	86	27	55	302	73994	40	59	99	401	108588
Sedona	BE	118	8	133	62	28	75	231	58618	11	60	72	302	84324
Crockett	BE	118	0	87	57	19	45	163	43483	38	98	136	299	84804
Calibra	BE	115	5	18	5	3	35	32	8409	54	25	79	111	25225
Delgado	BE	115	35	157	52	33	50	277	70390	57	37	94	371	98018
Gunnison	BE	110	5	74	35	37	35	150	60780	17	32	49	199	80480
Safrane	BE	106	5	96	52	35	40	188	66066	31	36	67	254	89609
Madras	BE		0	26	35	43	70	104	53333	8	35	43	147	73993
Mean			15	106	60	32	56	213	61871	28	53	80	293	89443
C.V. (%)			108	39	35	35	41	28	24	66	39	31	22	21
LSD (P = 0.05)			23	58	30	16	33	85	21639	26	30	35	93	26346

Planted May 8; pulled/harvested October 1

[1]HZ = Hazera Seeds Inc; BE = Bejo Seeds Inc.

[2]Maturity given by seed supplier; this season none of the hybrids reached half down at the time of harvest.

Table of Contents Home page

Soybean Variety Trial

L. Besemann and H. Eslinger

Two soybean variety trials were conducted at the Oakes Irrigation Research Site, a non-GMO (conventional trial) and a Roundup Ready® trial. Results for the conventional trial are listed in Table 1 and results for the Roundup Ready trial are listed in Table 2.

MATERIALS AND METHODS

Soil:	Egeland loam and Maddock sandy loam; soil N 42 lbs/acre.
Previous crop:	2012 – wheat.
Seedbed preparation:	Spring conventional tillage.
Planting:	Planted May 28 in 30-inch rows.
Plots:	Plots were 17 ft long by 5 ft (2 rows) wide. The study had four replications.
Fertilizer:	Broadcast 34 lbs N/acre, 81 lbs P_2O_5/acre, 103 lbs K_2O/acre and 19 lbs S/acre as 8-20-26-5 May 1.
Irrigation:	Overhead sprinkler irrigation as needed.
Pest control:	Weed control: Roundup Ready and conventional: Trust (1 pt/acre) May 28. Conventional: Basagran (1.5 pt/acre) + COC (1.25% v/v) June 26, Raptor (4 oz/acre) + NIS (0.25 % v/v) + AMS (1.5 lb/10 gal) July 5. Roundup Ready: Roundup Power Max (30 oz/acre) + AMS (1 lb/10 gal) June 24 and (40 oz/acre) + AMS (1 lb/10 gal) July 16. Disease control: Proline (5 oz/acre) July 18, July 24 and August 1. Insect control: Kendo (3½ oz/acre) July 24.
Harvest:	October 22 with a plot combine.

RESULTS

Yields in the Conventional trial averaged 57.2 bu/acre and the Roundup Ready trial averaged 73.8 bu/acre.

Table of Contents Home page

Table 1. Soybean variety trial (conventional) at the Oakes Irrigation Research Site in 2013.

Brand	Variety	Mat. Group[1]	JDAY of PM[2]	Plant Ht	Plant Lodge	Seed Oil	Seed Protein	Test Weight	Seed Yield 2013	Seed Yield 2-yr. Avg.	Seed Yield 3-yr. Avg.
				inch	0 to 9	%	%	lb/bu	bu/ac	bu/ac	bu/ac
Richland IFC	MK0508	0.8	268.8	28.8	3.0	17.2	36.2	58.6	50.1	52.5	45.9
Richland IFC	MK831	0.8	267.0	32.5	1.8	17.3	36.9	58.9	59.8	60.1	57.5
Richland IFC	MK850	0.8	272.5	31.5	1.8	18.6	36.5	57.7	44.1	--	--
Richland IFC	MK1016	1.0	273.5	36.5	2.5	16.5	38.1	59.0	39.3	49.2	52.0
Richland IFC	MK9101	1.1	274.0	36.8	2.3	18.9	36.3	57.0	62.2	--	--
Richland IFC	Challenger	1.3	282.0	40.5	3.0	17.5	38.8	57.6	63.7	60.6	--
SK Food	SK 0786	0.7	272.0	34.3	3.5	17.4	39.1	56.5	57.7	58.8	--
SK Food	SK095	0.9	267.0	36.0	2.0	16.4	38.1	58.9	51.8	51.7	--
SK Food	SK 0635	0.6	270.8	28.5	3.3	19.6	34.2	56.3	67.7	--	--
Thunder	5210NLL[3]	1.0	274.3	41.3	0.8	18.5	35.3	57.5	68.6	--	--
Thunder	5411LL[3]	1.1	275.0	39.5	1.8	18.5	35.8	57.2	64.2	--	--
	MEAN		272.4	35.1	2.3	17.8	36.8	57.7	57.2	--	--
	C.V. (%)		0.4	5.0	49.2	1.3	0.8	0.7	7.8	--	--
	LSD 0.10		1.2	2.1	1.4	0.3	0.4	0.5	5.4	--	--
	LSD 0.05		1.5	2.5	NS	0.3	0.4	0.6	6.5	--	--

Planting Date = May 28; Harvest Date = October 22; Previous Crop = Spring Wheat

[1] Maturity group based on data provided by seed company.

[2] Julian Day of PM: average of 272 = September 29.

[3] Soybean varieties 'Thunder 5210NLL' and 'Thunder 5411LL' are Liberty Link type varieties.

Table of Contents Home page

Table 2. Soybean variety trial (Roundup Ready) at the Oakes Irrigation Research Site in 2013. (Page 1 of 2)

Brand	Variety	Mat. Group[1]	JDAY of PM[2]	Plant Ht	Plant Lodge	Seed Oil	Seed Protein	Test Wt	Seed Yield 2013	Seed Yield 2-yr. Avg.	Seed Yield 3-yr. Avg.
				inch	0 to 9	%	%	lb/bu	---- bu/ac ----		
Asgrow	AG0732	0.7	266.8	37.8	0.0	18.9	35.2	56.3	69.6	--	--
Asgrow	AG0832	0.8	267.0	40.5	1.3	18.6	35.9	55.8	72.1	--	--
Asgrow	AG1132	1.1	271.3	37.3	0.0	18.2	35.4	56.6	78.7	--	--
Asgrow	AG1431	1.4	274.3	38.3	2.5	18.4	36.0	56.7	80.7	--	--
Channel	1101R2	1.1	271.8	38.8	0.5	18.4	35.1	56.4	73.1	--	--
Channel	1207R2	1.2	273.0	36.3	2.3	18.6	35.5	56.6	80.3	--	--
Dairyland	DSR-0747/R2Y	0.7	272.5	36.3	1.5	17.7	36.3	56.2	72.9	75.1	70.6
Dairyland	DSR-0904/R2Y	0.9	267.5	38.8	0.8	18.6	35.2	56.3	74.9	75.7	--
Dairyland	DSR-1120/R2Y	1.1	273.8	40.3	4.5	19.0	34.9	56.1	77.4	--	--
Dairyland	DSR-1215/R2Y	1.2	272.8	40.8	1.3	18.2	35.1	56.2	73.1	78.7	75.8
Dyna-Gro Seed	S08RY23	0.8	270.5	38.5	0.8	18.5	35.4	56.1	73.6	--	--
Dyna-Gro Seed	S09RY64	0.9	273.3	39.8	1.5	18.3	35.0	56.1	74.7	--	--
Dyna-Gro Seed	S12RY44	1.2	271.5	38.8	1.0	18.1	35.8	56.3	71.6	--	--
Integra	20810		267.5	36.8	0.0	18.3	34.7	58.0	73.8	73.2	--
Integra	20815		269.8	37.8	1.3	18.6	35.1	56.1	73.7	--	--
Kruger	K2-0101	0.1	264.3	34.0	1.0	18.6	35.6	55.5	65.5	65.2	64.5
Kruger	K2-0302	0.3	264.5	39.0	0.5	18.4	36.1	55.5	70.0	--	--
Kruger	K2-0504	0.5	264.5	37.0	0.0	18.6	35.3	55.2	78.2	76.3	--
Kruger	K2-0601	0.6	264.3	36.5	1.5	18.5	35.0	55.6	69.2	68.3	68.6
Kruger	K2-0801	0.8	267.0	38.0	0.3	18.5	35.3	56.6	78.7	76.5	74.4
Kruger	K2-0901	0.9	271.0	39.5	0.5	18.4	35.4	56.6	75.7	73.3	--
Kruger	K2-1001	1.0	270.0	39.0	3.8	17.8	36.0	56.4	70.9	70.9	69.8
Kruger	K2-1102	1.1	274.0	39.5	2.0	17.8	36.5	56.9	72.5	72.9	69.0
Kruger	K2-1103	1.1	272.8	37.8	1.3	18.6	35.5	56.5	74.9	--	--
Kruger	K2-1301	1.3	272.0	43.5	3.5	17.6	36.2	56.0	76.1	78.8	--
Nuseed	2071 RR2YN	0.7	267.8	35.0	0.0	18.5	35.3	57.1	75.8	--	--
Nuseed	2093 RR2YN	0.9	269.5	35.8	1.0	18.2	35.7	56.7	78.0	--	--
Nuseed	2122 RR2YN	1.2	272.8	39.3	1.0	18.7	35.8	56.3	77.8	--	--
NuTech/G2 Genetics	7063	0.6	265.8	37.5	1.0	19.0	34.2	55.9	68.7	--	--
NuTech/G2 Genetics	6088	0.8	267.0	33.5	0.5	18.7	35.3	55.9	77.7	78.6	77.1
NuTech/G2 Genetics	6093	0.9	266.5	36.5	0.8	19.0	35.8	56.3	68.2	--	--
NuTech/G2 Genetics	6098	0.9	272.5	38.8	1.3	18.4	35.5	56.1	70.1	73.3	71.0
	MEAN		269.8	38.3	1.3	18.3	35.6	56.3	73.8	--	--
	C.V. (%)		0.6	5.0	87.9	1.1	1.0	0.8	6.8	--	--
	LSD 0.10		1.8	2.2	1.3	0.2	0.4	0.5	5.8	--	--
	LSD 0.05		2.2	2.7	1.6	0.3	0.5	0.6	6.9	--	--

Planting Date = May 28; Harvest Date = October 22; Previous Crop = Spring Wheat

Table of Contents Home page

Table 2. Soybean variety trial (Roundup Ready) at the Oakes Irrigation Research Site in 2013. (Page 2 of 2)

Brand	Variety	Mat. Group[1]	JDAY of PM[2]	Plant Ht	Plant Lodge	Seed Oil	Seed Protein	Test Wt.	Seed Yield 2013	Seed Yield 2-yr. Avg.	Seed Yield 3-yr. Avg.
				inch	0 to 9	%	%	lb/bu	---- bu/ac ----		
NuTech/G2 Genetics	7110	1.1	270.8	38.0	2.5	18.4	35.8	55.5	68.8	70.4	68.9
NuTech/G2 Genetics	6143	1.4	273.5	39.5	2.3	17.9	36.2	56.5	73.4	74.0	--
PFS	14R10	1.0	272.3	36.5	0.5	17.8	35.6	56.8	67.6	--	--
PFS	14R13	1.3	273.3	37.5	0.3	18.0	36.1	56.0	68.7	--	--
Proseed	20-90	0.9	267.5	38.8	1.0	18.2	35.9	56.2	74.9	72.4	--
Proseed	PX11	1.1	265.3	38.3	0.8	18.4	35.9	56.1	75.2	--	--
Proseed	PX12	1.2	272.0	38.3	0.3	18.8	35.9	56.1	80.2	--	--
Proseed	2-140	1.4	274.5	44.0	2.0	18.6	35.7	57.3	82.8	75.6	--
REA	66G14	0.6	266.8	37.0	1.3	18.0	35.9	56.4	65.9	--	--
REA	69G13	0.9	269.3	38.8	2.0	18.5	35.4	56.4	72.4	75.1	--
REA	69G14	0.9	271.5	39.0	0.8	18.7	35.0	56.7	79.5	--	--
REA	71G14	1.1	271.8	37.8	1.8	18.8	35.2	57.0	81.6	--	--
REA	71G20	1.1	270.3	40.0	3.8	17.9	35.9	56.4	71.9	71.3	--
Thunder	3211R2Y	1.1	272.3	39.8	2.5	17.4	37.1	56.1	69.7	70.4	68.2
Thunder	3114R2Y	1.4	273.3	43.0	3.5	17.7	36.0	56.9	74.5	78.2	--
Wensman	W3062NR2	0.6	261.3	35.5	1.0	17.5	37.4	55.3	69.6	--	--
Wensman	W3076R2	0.7	265.5	39.3	0.5	18.2	35.8	56.2	70.6	72.1	--
Wensman	W3090NR2	0.8	267.0	38.5	0.3	18.6	35.3	55.9	73.6	73.5	--
Wensman	W3102NR2	1.0	271.5	39.3	0.8	18.2	35.1	56.6	77.5	--	--
Wensman	W3121NR2	1.2	272.3	39.0	1.3	18.0	36.0	57.1	76.4	--	--
Wensman	W3128R2	1.2	269.3	38.0	1.0	18.2	36.0	56.0	67.6	--	--
	MEAN		269.8	38.3	1.3	18.3	35.6	56.3	73.8	--	--
	C.V. (%)		0.6	5.0	87.9	1.1	1.0	0.8	6.8	--	--
	LSD 0.10		1.8	2.2	1.3	0.2	0.4	0.5	5.8	--	--
	LSD 0.05		2.2	2.7	1.6	0.3	0.5	0.6	6.9	--	--

Planting Date = May 28; Harvest Date = October 22; Previous Crop = Spring Wheat

[1] Maturity group based on data provided by seed company.

[2] Julian Day of PM: average of 270 = September 27.

Table of Contents Home page

Energy Beet Variety Trial

Syngenta, Green Vision Group and NDSU

An irrigated energy beet variety trial was initiated at Oakes in 2009 as a cooperative project among the Green Vision Group and Syngenta and was continued in 2013. Energy beets hold a great potential as feed stock for ethanol plants. High yielding energy beet germplasm may yield higher than germplasm for sugarbeets that must meet rigid sugar quality and impurity indexes. It is the objective of this trial to determine the yield potential of energy beets under irrigation in southeast North Dakota.

MATERIALS AND METHODS

Soil:	Maddock sandy loam; N 16 lbs/acre.
Previous crops:	2012 – barley.
Seedbed preparation:	Conventional tillage practices.
Planting:	May 16. Sugarbeet were planted in rows on 22-inch centers.
Plots:	Plots were 5.5 ft (three rows) wide by 160 ft long. The study had four replications.
Fertilizer:	Broadcast 34 lbs N/acre, 81 lbs P_2O_5/acre, 103 lbs K_2O/acre and 19 lbs S/acre as 8-20-26-5 May 1. Stream bar 60 lbs N/acre June 12 and June 27, stream bar 50 lbs N/acre July 14 as 28-0-0.
Irrigation:	Overhead sprinkler irrigation as needed.
Pest control:	Roundup Power Max (30 oz/acre) June 6 and Roundup Power Max (40 oz/acre) July 4 for weed control. Proline (5.7 oz/acre) August 13 and September 10, Headline (12 oz/acre) August 27 for disease control. Kendo (3½ oz/acre) July 29 for insect control.
Harvest:	September 30, harvest area was two 30 foot sections from the center row of each plot.

Table 1. Sugar content, root yield and overall sugar yield of energy beet varieties at the Oakes Irrigation Research Site in 2013.

	Root Yield	Sugar Content	Sugar Yield
	ton/ac	%	lb/ac
1	30.2	15.8	9,543
2	28.8	16.1	9,235
3	28.5	16.3	9,275
4	30.5	15.4	9,403
5	32.0	15.9	10,150
6	34.2	15.5	10,583
7	31.2	15.8	9,828
8	29.7	16.0	9,467
MEAN	30.6	15.8	9,694

Planting Date: April 23; Harvest Date: September 30

Table of Contents Home page

Fortix Corn Study

W. Albus, R. Dodds, L. Besemann and H. Eslinger

MATERIALS AND METHODS

Soil: Embden loam and Maddock sandy loam; soil N 52 lbs N/acre.

Previous crops: 2012 – onion and sugar beet.

Seedbed preparation: Spring conventional tillage.

Planting: May 25, Wensman W7268VT3PRIB in 30-inch rows.

Plots: Plots were 40 ft long by 15 ft (6 rows) wide. The study had four replications.

Fertilizer: Broadcast 34 lbs N/acre, 81 lbs P_2O_5/acre, 103 lbs K_2O/acre, 19 lbs S/acre May 1, stream bar 60 lbs N/acre May 31 and sidedress 180 lbs N/acre as 28-0-0 June 24.

Irrigation: Overhead sprinkler irrigation as needed.

Pest control: Harness (2 pt/acre) May 26, Laudis (3 oz/acre) + Roundup Power Max (40 oz/acre) + AAtrex 9-0 (0.5 lb ai/acre) + Destiny (0.05 %v/v) + AMS (1½ lb/acre) June 13. Fortix treatments (5 oz/acre) applied on June 26 and July 3.

Harvest: November 5 with a plot combine. Harvest area was the center two rows, 37 feet long.

Table 1. Agronomic data for the Fortix corn study at the Oakes Irrigation Research Site in 2013.

Fortix Treatment	Yield[1]	Harvest Moisture	Test Weight	Chorophyll Meter Reading	Silk Date	Grain Oil	Grain Protein	Grain Starch
oz/ac	bu/ac	%	lb/bu	16-Sep		%	%	%
check	248.7 a	22.9 a	51.2 a	47.5 a	7/30 a	4.0 a	9.4 a	71.9 a
5 oz	251.5 a	22.5 a	52.0 a	50.5 a	7/30 a	3.8 a	8.8 b	72.1 a
LSD (P = 0.05)	9.9	0.7	1.7	4.6		0.7	0.5	0.8
C.V. (%)	3.1	2.5	2.5	7.2		14.3	4.0	0.9
Grand Mean	250.1	22.7	51.6	49.0	7/30	3.9	9.1	72.0

Planting Date = May 25; Harvest Date = November 5; Previous Crop = Onion/sugar beet

[1] Yield adjusted to 15.5% Moisture.

Table of Contents Home page

KTS Fertilizer Corn Study

W. Albus, L. Besemann and H. Eslinger

MATERIALS AND METHODS

Soil:	Maddock sandy loam and Hecla sandy loam.
Previous crops:	2012 - edible bean and sugarbeet.
Seedbed preparation:	Spring conventional tillage.
Planting:	May 25, Wensman W7268VT3PRIB in 30-inch rows.
Plots:	Plots were 80 ft long by 15 ft (6 rows) wide. The study had three replications.
Fertilizer:	Broadcast 34 lbs N/acre, 81 lbs P_2O_5/acre, 103 lbs K_2O/acre, 19 lbs S/acre May 1. Stream bar 60 lbs N/acre May 31 and sidedress 180 lbs N/acre as 28-0-0 June 24. KTS treatments: Trt 1 = none, trt 2 = 2.5 gal/acre, trt 3 = 5 gal/acre and trt 4 = 10 gal/acre June 24.
Irrigation:	Overhead sprinkler irrigation as needed.
Pest control:	Harness (2 pt/acre) May 23, Laudis (3 oz/acre) + Roundup Power Max (40 oz/acre) + AAtrex 9-0 (0.5 lb ai/acre) + Destiny (0.05 %v/v) + AMS (1½ lb/acre) June 14.
Harvest:	October 25 with a 4400 JD combine and recorded with a weigh wagon. Harvest area was the center four rows 77 feet long.

Table of Contents Home page

Table 1. Agronomic data for the KTS fertilizer corn study at the Oakes Irrigation Research Site in 2013.

KTS Treatment	Yield[1]	Harvest Moisture	Test Weight	Silk Date	Chlorophyll[2] Meter Reading	Return $/ac[3] For Yield minus KTS Cost	Grain Oil	Grain Protein	Grain Starch
	bu/ac	%	lb/bu		12-Aug		%	%	%
0	242.2 a[4]	24.5 a	51.7 a	7/31 a	54.7 a	$969 a	4.5 ab	6.6 a	74.1 a
2.5 gal per acre	244.7 a	24.7 a	51.1 a	7/30 a	56.4 a	$967 a	4.1 b	7.6 a	73.1 a
5.0 gal per acre	244.3 a	24.8 a	50.3 a	7/31 a	55.4 a	$955 a	4.4 ab	7.4 a	72.7 a
10.0 gal per acre	252.9 a	24.0 a	50.6 a	7/30 a	53.8 a	$966 a	4.7 a	6.6 a	74.5 a
LSD (P = 0.05)	16.1	1.0	1.0	1.1	7.1	64.6	0.4	1.0	2.9
Standard Deviation	8.1	0.5	0.5	0.55	3.5	32.3	0.2	0.5	1.4
C.V. (%)	3.3	2.02	1.0	0	6.4	3.4	4.2	7.4	2.0
Grand Mean	246.0	24.48	50.9	7/30	55.1	964.1	4.4	7.1	73.6

Planting Date = May 25; Harvest Date = November 5; Previous Crop = Edible bean/sugarbeet

[1] Yield adusted to 15.5% moisture.

[2] Opti-Science CCM 200.

[3] Corn $4.00/bu; KTS $750/ton.

[4] Means followed by same letter are not significantly different (P = 0.05).

Table of Contents Home page

Fine Tuning Microrates for Early Season Broadleaf Weed Control in Onion

H. Hatterman-Valenti and C. Auwarter

Weed control in onion is essential to produce marketable bulbs and is compounded by the crop's notoriously competitive nature, especially during establishment when onion can take anywhere from 4-10 weeks to reach the 2-leaf stage. Broadleaf weeds such as common lambsquarters and redroot pigweed gain a competitive advantage over the establishing onion crop if weed control methods are not implemented. PRE and POST herbicide options prior to the 2-leaf stage are few, and often ineffective. This study was conducted at the Oakes Irrigation Research Facility near Oakes, North Dakota to compare early-season weed control of bromoxynil (Buctril and Broclean) and oxyfluorfen (GoalTender) applied at micro rates to a standard pre-emergence treatment of DCPA (Dacthal) and ethofumesate (Nortron) in onion. 'Sedona' and 'Crocket' onion were planted May 15 with 18" centers and a planting population of 175,000 seeds/ac. PRE treatments included 1 and 2 lb/ac ethofumesate and 13.33 lb/ac DCPA and were applied 9 days after planting (DAP). Micro rate applications began between the flag-leaf and one-leaf stage, 23 DAP. Bromoxynil and oxyfluorfen were applied at the 0.25 and 0.13 times the lowest labeled rate along with 0.031 lb/ac clethodim (Select) and applied in four or five sequential applications when weeds and onion were in seedling growth stages. Petroleum oil-surfactant (Herbimax) (1 pt/ac) was tank mixed with the micro rate application. The pre-emergence treatments received Buctril at 1 pt and Goal at 2 pt/ac during the 5-leaf stage.

Table 1. Treatment application information.

Date:		5/24/2013	6/7/2013	6/14/2013	6/22/2013	7/1/2013	7/8/2013
Time:		A	B	C	D	E	F
Sprayer:	GPA:	20	20	20	20	20	20
	PSI:	40	40	40	40	40	40
	Nozzle:	11002	11002	11002	11002	8002	8002
Air Temperature (F):		62	62	77	77	82	80
Relative Humidity (%):		44	75	8156	71	34	54
Soil Moisture:		Adequate	Adequate	Adequate	Excessive	Adequate	Adequate
Wind (MPH):		14	10	11	8	4	5
Cloud Cover (%):		50	5	65	25	20	90
Onion Stage:		Seed Cracking	1-leaf	2-leaf	3-leaf	4-leaf	5-leaf

Table of Contents Home page

Table 2. Treatment details.

Trt No	Trt Name	Rate	Rate Unit/ac	App Code	Trt No	Trt Name	Rate	Rate Unit/ac	App Code	Trt No	Trt Name	Rate	Rate Unit/ac	App Code
1	Buctril	4	floz	B	4	Buctril	4	Floz	B	9	Buctril	2	Floz	B
	Select Max	4	floz	B		Select Max	4	Floz	B		Select Max	4	Floz	B
	Herbimax	1	pt	B		Herbimax	1	Pt	B		Herbimax	1	Pt	B
	Buctril	4	floz	C		Buctril	4	Floz	C		Buctril	2	Floz	C
	Select Max	4	floz	C		Select Max	4	Floz	C		Select Max	4	Floz	C
	Herbimax	1	pt	C		Herbimax	1	Pt	C		Herbimax	1	Pt	C
	Buctril	2	floz	D		Buctril	4	Floz	D		Buctril	2	Floz	D
	Goal Tender	2	floz	D		Select Max	4	Floz	D		Goal Tender	2	Floz	D
	Select Max	4	floz	D		Herbimax	1	Pt	D		Select Max	4	Floz	D
	Herbimax	1	pt	D		Buctril	4	Floz	E		Herbimax	1	Pt	D
	Buctril	2	floz	E		Select Max	4	Floz	E		Buctril	2	Floz	E
	Goal Tender	2	floz	E		Herbimax	1	Pt	E		Goal Tender	2	Floz	E
	Select Max	4	Floz	E		Buctril	4	Floz	F		Select Max	4	Floz	E
	Herbimax	1	Pt	E		Select Max	4	Floz	F		Herbimax	1	Pt	E
2	Buctril	2	Floz	B		Herbimax	1	Floz	F	10	Buctril	4	Floz	B
	Select Max	4	Floz	B	5	Goal Tender	2	Floz	B		Select Max	4	Floz	B
	Herbimax	1	Pt	B		Select Max	4	Floz	B		Herbimax	1	Pt	B
	Buctril	2	Floz	C		Herbimax	1	Pt	B		Buctril	4	Floz	C
	Select Max	4	Floz	C		Goal Tender	2	Floz	C		Select Max	4	Floz	C
	Herbimax	1	Pt	C		Select Max	4	Floz	C		Herbimax	1	Pt	C
	Buctril	2	Floz	D		Herbimax	1	Pt	C		Buctril	4	Floz	D
	Select Max	4	Floz	D		Goal Tender	2	Floz	D		Goal Tender	2	Floz	D
	Herbimax	1	Pt	D		Select Max	4	Floz	D		Select Max	4	Floz	D
	Buctril	2	Floz	E		Herbimax	1	Pt	D		Herbimax	1	Pt	D
	Goal Tender	2	Floz	E		Goal Tender	2	Floz	E		Buctril	4	Floz	E
	Select Max	4	Floz	E		Select Max	4	Floz	E		Goal Tender	2	Floz	E
	Herbimax	1	Pt	E		Herbimax	1	Pt	E		Select Max	4	Floz	E
	Buctril	2	Floz	F		Goal Tender	2	Floz	F		Herbimax	1	Pt	E
	Goal Tender	2	Floz	F		Select Max	4	Floz	F	11	Buctril	4	Floz	B
	Select Max	4	Floz	F		Herbimax	1	Pt	F		Select Max	4	Floz	B
	Herbimax	1	Pt	F	6	Dacthal	10	Lb	A		Herbimax	1	Pt	B
3	Goal Tender	1	Floz	B		Buctril	1	Pt	F		Buctril	4	Floz	C
	Buctril	2	Floz	B		Goal	2	Pt	F		Select Max	4	Floz	C
	Select Max	4	Floz	B		Select Max	12	Floz	F		Herbimax	1	Pt	C
	Herbimax	1	Pt	B		Herbimax	1	Pt	F		Buctril	4	Floz	D
	Goal Tender	1	Floz	C	7	Nortron	2	Pt	A		Select Max	4	Floz	D
	Buctril	2	Floz	C		Buctril	1	Pt	F		Herbimax	1	Pt	D
	Select Max	4	Floz	C		Goal	2	Pt	F		Buctril	4	Floz	E
	Herbimax	1	Pt	C		Select Max	12	Floz	F		Goal Tender	2	Floz	E
	Goal Tender	1	Floz	D		Herbimax	1	Pt	F		Select Max	4	Floz	E
	Buctril	2	Floz	D	8	Nortron	4	Pt	A		Herbimax	1	Pt	E
	Select Max	4	Floz	D		Buctril	1	Pt	F		Buctril	4	Floz	F
	Herbimax	1	Pt	D		Goal	2	Pt	F		Goal Tender	2	Floz	F
	Goal Tender	1	Floz	E		Select Max	12	Floz	F		Select Max	4	Floz	F
	Buctril	2	Floz	E		Herbimax	1	Pt	F		Herbimax	1	Pt	F
	Select Max	4	Floz	E						12	Untreated			
	Herbimax	1	Pt	E										
	Goal Tender	1	Floz	F										
	Buctril	2	Floz	F										
	Select Max	4	Floz	F										
	Herbimax	1	Pt	F										

Table of Contents Home page

Table 2. Treatment details (continued).

Trt No	Trt Name	Rate	Rate Unit/ac	App Code	Trt No	Trt Name	Rate	Rate Unit/ac	App Code	Trt No	Trt Name	Rate	Rate Unit/ac	App Code
13	Broclean	2	Floz	B	14	Broclean	4	Floz	B	15	Nortron	2	Pt	A
	Select Max	4	Floz	B		Select Max	4	Floz	B		Broclean	1	Pt	F
	Herbimax	1	Pt	B		Herbimax	1	Pt	B		Goal	2	Pt	F
	Broclean	2	Floz	C		Broclean	4	Floz	C		Select Max	12	Floz	F
	Select Max	4	Floz	C		Select Max	4	Floz	C		Herbimax	1	Pt	F
	Herbimax	1	Pt	C		Herbimax	1	Pt	C	16	Broclean	4	Floz	B
	Broclean	4	Floz	D		Broclean	4	Floz	D		Select Max	4	Floz	B
	Select Max	4	Floz	D		Select Max	4	Floz	D		Herbimax	1	Pt	B
	Herbimax	1	Pt	D		Herbimax	1	Pt	D		Broclean	4	Floz	C
	Broclean	2	Floz	E		Broclean	4	Floz	E		Select Max	4	Floz	C
	Goal Tender	2	Floz	E		Select Max	4	Floz	E		Herbimax	1	Pt	C
	Select Max	4	Floz	E		Herbimax	1	Pt	E		Broclean	4	Floz	D
	Herbimax	1	Pt	E		Broclean	4	Floz	F		Goal Tender	2	Floz	D
	Broclean	2	Floz	F		Select Max	4	Floz	F		Select Max	4	Floz	D
	Goal Tender	2	Floz	F		Herbimax	1	Pt	F		Herbimax	1	Pt	D
	Select Max	4	Floz	F							Broclean	4	Floz	E
	Herbimax	1	Pt	F							Goal Tender	2	Floz	E
											Select Max	4	Floz	E
											Herbimax	1	Pt	E

Table 3. Weed and injury ratings.

Trt	% CONTROL								
No	CHEAL[1]	AMARE[2]	Injury	CHEAL	AMARE	Injury	CHEAL	AMARE	Injury
	---------6/25/2013---------			--------7/16/2013--------			--------8/16/2013--------		
1	100 a[3]	100 a	10 a	98 ab	98 a	0 a	68 b	78 b	0 a
2	95 a	89 bcd	8 abc	98 ab	93 a	0 a	83 ab	85 ab	0 a
3	99 a	99 ab	10 a	99 ab	98 a	0 a	79 ab	93 ab	0 a
4	100 a	99 ab	6 a-d	100 a	99 a	0 a	84 ab	94 ab	0 a
5	100 a	99 ab	6 a-d	91 b	100 a	0 a	70 ab	94 ab	0 a
6	98 a	78 d	4 b-e	100 a	84 b	0 a	99 a	86 ab	0 a
7	59 c	96 abc	4 b-e	96 ab	95 a	0 a	86 ab	91 ab	0 a
8	80 b	94 abc	3 cde	96 ab	98 a	0 a	83 ab	96 a	0 a
9	94 a	100 a	6 a-d	93 ab	95 a	0 a	69 ab	86 ab	0 a
10	99 a	99 ab	9 ab	99 ab	99 a	0 a	75 ab	85 ab	0 a
11	100 a	99 ab	8 abc	100 a	99 a	0 a	95 ab	96 a	0 a
12	0 e	0 e	0 e	0 c	0 c	0 a	0 c	0 c	0 a
13	100 a	97 abc	10 a	100 a	95 a	0 a	96 ab	94 ab	0 a
14	100 a	99 ab	8 abc	99 ab	99 a	0 a	95 ab	95 a	0 a
15	53 d	86 cd	2 de	94 ab	95 a	0 a	93 ab	96 a	0 a
16	100 a	100 a	6 a-d	99 ab	99 a	0 a	76 ab	90 ab	0 a
LSD (P = 0.05)	4.53	9.87	3.23	4.84	4.96	0	17.17	10.17	0

[1] CHEAL = Common lambsquarters.

[2] AMARE = Redroot pigweed.

[3] Data followed by different letters are significantly different at P < 0.05.

Table 4. Crocket onion yield results.

Trt	1 Double Row X 6'												
No	----<1"----		--1" to 2.25"--		--2.25" to 3"--		--3" to 4" --		----- >4" -----		-----Total-----		
	#	lbs	#	lbs	#	lbs	#	lbs	#	lbs	#	lbs	CWT/ac
1	2 a[1]	0 a	14 a	1.6 a	9 a	2.8 a	1.5 a	0.9 ab	0.0 a	0.0 a	25.8 a	5.28 a-e	511 a-e
2	1 a	0 a	5 bc	0.7 abc	9 a	2.9 a	5.8 a	4.1 ab	0.0 a	0.0 a	20.5 ab	7.7 a-d	748 a-d
3	0 a	0 a	7 abc	1 ab	9 a	2.9 a	1.5 a	0.8 ab	0.0 a	0.0 a	17.5 ab	4.7 a-e	453 a-e
4	2 a	0 a	10ab	1 ab	2 bc	0.4 b	0.3 a	0.1 b	0.0 a	0.0 a	13.3 b	1.6 de	152 de
5	0 a	0 a	6 bc	0.8 abc	9 a	3.2 a	4.8 a	3.1 ab	1.3 a	1.5 a	20.8 ab	8.5 abc	823 abc
6	1 a	0 a	4 bc	0.7 abc	8 ab	3.1 a	8.8 a	6.5 a	0.8 a	0.9 a	22.0 ab	11.1 a	1075 a
7	1 a	0 a	5 bc	0.6 abc	6 abc	2.0 ab	6.0 a	3.9 ab	0.5 a	0.6 a	17.3 ab	7.1 a-d	685 a-d
8	1 a	0 a	5 bc	0.8 abc	8 ab	2.6 a	8.0 a	5.5 ab	0.5 a	0.7 a	21.5 ab	9.6 ab	924 ab
9	1 a	0 a	8 ab	1.1 ab	8 ab	2.4 a	1.8 a	1.0 ab	0.0 a	0.0 a	18.8 ab	4.5 a-e	436 a-e
10	3 a	0 a	6 bc	0.6 abc	6 ab	1.9 ab	3.3 a	2.1 ab	0.0 a	0.0 a	18.5 ab	4.7 a-e	453 a-e
11	1 a	0 a	11ab	1.3 ab	5 abc	1.8 ab	4.0 a	2.7 ab	0.0 a	0.0 a	20.3 ab	5.8 a-e	561 a-e
12	0 a	0 a	0 c	0 c	0 c	0 b	0.0 a	0.0 b	0.0 a	0.0 a	0.0 c	0.0 e	0.0 e
13	1 a	0 a	4 bc	0.6 bc	8 ab	2.8 a	7.3 a	4.5 ab	0.8 a	0.8 a	20.8 ab	8.6 abc	835 abc
14	3 a	0 a	10ab	1.1 ab	2 bc	0.5 b	0.5 a	0.4 b	0.0 a	0.0 a	14.5 b	2.0 cde	194 cde
15	1 a	0 a	7 abc	1 ab	8 ab	2.9 a	6.8 a	4.3 ab	0.0 a	0.0 a	22.8 ab	8.2 abc	796 abc
16	2 a	0 a	6 bc	0.6 abc	5 abc	1.6 ab	2.0 a	1.0 ab	0.0 a	0.0 a	14.8 b	3.2 b-e	312 b-e
LSD (P = 0.05)	2.5	0	4.7	0.6	4	1.3	4.9	3.3	1.2	1.4	6	3.9	380

[1] Data followed by different letters are significantly different at P < 0.05.

Table of Contents Home page

Table 5. Sedona onion yield results.

Trt No	1 Double Row X 6'												
	----<1"----		--1" to 2.25"--		--2.25" to 3"--		--3" to 4" --		----- >4" -----		-----Total-----		
	#	lbs	#	lbs	#	lbs	#	lbs	#	lbs	#	lbs	CWT/ac
1	1 a[1]	0 a	12 a	1.5 a	9 ab	2.8 ab	1.3 b	0.7 b	0.0 a	0.0 a	22.8 a	5.0 bcd	486 bcd
2	1 a	0 a	7 ab	0.7 ab	8 ab	2.7 ab	4.0 ab	2.8 ab	0.3 a	0.4 a	20.0 ab	6.5 abc	629 abc
3	1 a	0 a	5 ab	0.7 ab	13 a	4.4 a	5.5 ab	3.5 ab	0.0 a	0.0 a	23.5 a	8.5 ab	818 ab
4	1 a	0 a	8 ab	0.9 ab	2 bc	0.7 bc	0.3 b	0.1 b	0.0 a	0.0 a	11.0 b	1.7 cd	165 cd
5	0 a	0 a	6 ab	0.9 ab	11 a	3.7 a	5.3 ab	3.8 ab	0.3 a	0.4 a	22.0 a	8.7 ab	842 ab
6	0 a	0 a	5 ab	0.7 ab	7 ab	2.5 abc	11.3 a	7.8 a	0.8 a	0.9 a	24.0 a	11.9 a	1150 a
7	1 a	0 a	5 ab	0.8 ab	7 ab	2.0 abc	3.5 ab	2.2 ab	0.0 a	0.0 a	16.0 ab	5.0 bcd	484 bcd
8	0 a	0 a	3 ab	0.5 ab	6 abc	2.0 abc	8.5 ab	5.9 ab	1.0 a	1.0 a	18.5 ab	9.4 ab	908 ab
9	1 a	0 a	8 ab	1.2 ab	9 ab	2.9 ab	1.8 b	1.0 b	0.0 a	0.0 a	19.8 ab	5.0 bcd	484 bcd
10	2 a	0 a	9 ab	1.1 ab	7 ab	2.0 abc	2.3 b	1.2 b	0.3 a	0.3 a	19.8 ab	4.6 bcd	448 bcd
11	2 a	0 a	7 ab	1.0 ab	8 ab	2.7 ab	5.3 ab	3.4 ab	0.0 a	0.0 a	21.8 ab	7.2 abc	692 abc
12	0 a	0 a	0 b	0.0 b	0 ab	0.0 c	0.0 b	0.0 b	0.0 a	0.0 a	0.0 c	0.0 d	0 d
13	1 a	0 a	5 ab	0.7 ab	10 ab	3.1 ab	7.0 ab	4.4 ab	0.3 a	0.4 a	22.5 a	8.6 ab	833 ab
14	2 a	0 a	9 ab	0.9 ab	6 abc	1.8 abc	0.3 b	0.1 b	0.0 a	0.0 a	17.0 ab	2.9 bcd	276 bcd
15	0 a	0 a	5 ab	0.7 ab	7 ab	2.3 abc	8.0 ab	5.3 ab	0.0 a	0.0 a	19.8 ab	8.3 ab	801 ab
16	1 a	0 a	7 ab	0.9 ab	6 abc	1.7 abc	3.8 ab	2.2 ab	0.0 a	0.0 a	17.8 ab	4.8 bcd	467 bcd
LSD (P = 0.05)	1.3	0	5.3	0.7	4.4	1.6	4.9	3.4	0.8	0.9	6.5	3.8	371

[1] Data followed by different letters are significantly different at P < 0.05.

Table of Contents Home page

Table 6. Crocket plus Sedona yield results.

Trt No	<1"	1" to 2.25"	2.25" to 3"	3" to 4"	>4"	Total
	----------CWT/ac----------					
1	1.2 a[1]	152 a	271 abc	74 bc	0.0 a	499 bcd
2	2.4 a	69 bc	270 abc	330 abc	17 a	689 abc
3	0.0 a	80 ab	350 a	206 bc	0.0 a	635 abc
4	0.0 a	93 ab	53 de	12 c	0.0 a	159 cd
5	0.0 a	80 ab	333 ab	330 abc	90 a	833 ab
6	0.0 a	67 bc	271 abc	687 a	87 a	1112 a
7	1.2 a	65 bc	191 a-d	298 abc	29 a	584 abc
8	0.0 a	62 bc	226 abc	547 ab	81 a	916 ab
9	0.0 a	110 ab	254 abc	95 bc	0.0 a	460 bcd
10	3.6 a	85 ab	190 a-d	160 bc	0.0 a	450 bcd
11	3.6 a	111 ab	217 abc	295 abc	0.0 a	627 abc
12	0.0 a	0.0 c	0.0 e	0.0 c	0.0 a	0.0 d
13	1.2 a	59 bc	288 abc	426 abc	59 a	834 ab
14	4.8 a	94 ab	110 cde	25 c	0.0 a	235 cd
15	0.0 a	85 ab	250 abc	463 abc	0.0 a	799 ab
16	1.2 a	73 abc	159 bcd	157 bc	0.0 a	390 bcd
LSD (P = 0.05)	3.9	49	107	278	98	335

[1] Data followed by different letters are significantly different at P < 0.05.

Treatments that included bromoxynil during at least one of the application timings provided better common lambsquarters control throughout the trial compared to treatments without bromoxynil with the exception of treatment 1. Treatments that included a fifth micro rate with bromoxynil or bromoxynil tank mixed with oxyfluorfen had better control of common lambsquarter than treatments with only four applications.

The highest yielding treatment was the preemergence conventional treatment of DCPA applied at 7.5 lb/ac followed by a tank mix of bromoxynil and oxyfluorfen at 0.25 lb/ac with 1112 CWT/ac. The lowest yielding treatment besides the untreated, which didn't produce anything, was when bromoxynil was applied at 0.0625 lb/ac through all applications with 159 CWT/ac. The highest yielding treatment using the micro rate applications was with bromoxynil (Broclean treatment) at 0.031 lb/ac followed by bromoxynil and oxyfluorfen at 0.031 lb/ac with 834 CWT/ac and oxyfluorfen at 0.031 lb/ac applied throughout the season with 833 CWT/ac.

Table of Contents Home page

Mosaic Corn Study

K. Mann, W. Albus, R. Dodds, L. Besemann and H. Eslinger

MATERIALS AND METHODS

Soil: Maddock sandy loam; pH = 7.1; 2.4 percent organic matter; soil N 36 lbs/acre; soil P and soil K were very high; soil S was high.

Previous crop: 2012 - soybean.

Seedbed preparation: Spring conventional tillage.

Planting: May 16, DeKalb DKC-49-29 in 30-inch rows.

Plots: Plots were 40 ft long by 15 ft (6 rows) wide. The study had four replications.

Fertilizer: Broadcast and incorporated treatments (see treatments in table 1) May 14, May 15 and June 10, stream bar 60 lbs N/acre as 28-0-0 May 25 and sidedress N as 28-0-0 June 24 to all treatments except # 1 to bring the total N applied to 180 lbs/acre.

Irrigation: Overhead sprinkler irrigation as needed.

Pest control: Outlook (18 oz/acre) May 31, Laudis (3 oz/acre) + Roundup Power Max (40 oz/acre) + AAtrex 9-0 (0.5 lb ai/acre) + Destiny (0.05 %v/v) + AMS (1½ lb/acre) June 11.

Harvest: November 5 with a plot combine. Harvest area was the center two rows, 37 feet long.

Table 1. Treatments for the Mosaic corn study at the Oakes Irrigation Research Site in 2013.

Treatment		N	P_2O_5	K_2O	S	Zn
		----------lb/ac----------				
1		60	0	60	0	0
2		180	0	60	0	0
3		180	80	60	0	0
4		180	80	60	20	5
5		180	80	60	20	2
6	Mes10	180	80	60	20	0
7	Mesz	180	80	60	20	2
8	Mes15	180	80	60	36	0

Table of Contents Home page

Table 2. Agronomic data for the Mosaic corn study at the Oakes Irrigation Research Site in 2013.

Treatment	Yield	Harvest Moisture	Test Weight	Silk Date	Ear Height	Tassel Height	Grain Oil	Grain Protein	Grain Starch	Chlorophyll meter[1] Reading	Chlorophyll meter[1] Reading	NDRE[2]
	bu/ac	%	lb/bu		inch	inch	%	%	%	12-Jul	6-Aug	6-Aug
1	168.2 b[3]	22.4 a	52.2 a	8/1 a	42.0 b	94.8 b	3.6 a	8.5 b	72.4 a	26.2 b	26.9 b	0.304 b
2	234.8 a	22.2 a	53.1 a	7/30 b	45.8 a	102.3 a	3.5 a	9.3 a	72.4 a	40.3 a	50.3 a	0.361 a
3	233.2 a	22.4 a	51.0 a	7/29 b	44.5 ab	102.5 a	3.9 a	9.3 a	71.7 a	36.4 a	48.2 a	0.353 a
4	235.9 a	21.9 a	51.6 a	7/29 b	44.8 ab	102.0 a	3.8 a	9.4 a	71.8 a	37.9 a	51.5 a	0.357 a
5	237.5 a	22.4 a	52.6 a	7/29 b	43.8 ab	101.3 a	3.5 a	9.2 a	72.4 a	40.2 a	50.5 a	0.358 a
6	233.9 a	22.0 a	52.0 a	7/29 b	44.3 ab	102.0 a	3.7 a	9.1 a	72.0 a	38.8 a	49.2 a	0.361 a
7	234.8 a	22.1 a	53.3 a	7/29 b	44.3 ab	100.8 a	3.5 a	9.2 a	72.4 a	39.3 a	49.4 a	0.347 a
8	233.0 a	22.2 a	51.8 a	7/29 b	45.0 a	102.5 a	3.6 a	9.4 a	72.1 a	38.5 a	48.6 a	0.347 a
LSD (P = 0.05)	12.2	0.6	1.8	1.1	1.9	2.6	0.3	0.2	0.6	4.1	4.6	0.015
C.V. (%)	3.7	1.9	2.4	0	2.9	1.7	5.5	1.7	0.6	7.5	6.7	2.8

Planting Date = May 16; Harvest Date = November 5; Previous Crop = Soybean

[1] Opti-Science CCM 200.

[2] Holland Crop Circle ACS active canopy sensor (normalized difference red edge) - NDRE.

[3] Means followed by same letter are not significantly different (P = 0.05).

Table of Contents Home page

Table 2. Agronomic data for the Mosaic corn study at the Oakes Irrigation Research Site in 2013.

	24-Jun V5.5L Plant Tissue Samples					5-Aug R1 Ear Leaf Tissue Samples				
Treatment	N	P	K	S	Zn	N	P	K	S	Zn
	%	%	%	%	ppm	%	%	%	%	ppm
1	4.15 a[3]	0.58 a	5.43 a	0.24 a	46.3 a	2.03 b	0.27 b	2.16 a	0.22 a	23.8 a
2	4.15 a	0.61 a	5.41 a	0.24 a	47.8 a	2.65 a	0.33 a	2.26 a	0.19 a	24.3 a
3	4.15 a	0.64 a	5.67 a	0.24 a	46.5 a	2.58 a	0.34 a	2.24 a	0.20 a	22.5 a
4	4.20 a	0.63 a	5.51 a	0.24 a	44.8 a	2.85 a	0.36 a	2.20 a	0.19 a	23.3 a
5	4.23 a	0.65 a	5.48 a	0.26 a	47.5 a	2.65 a	0.35 a	2.17 a	0.20 a	23.3 a
6	4.28 a	0.61 a	5.54 a	0.24 a	45.3 a	2.70 a	0.35 a	2.28 a	0.19 a	21.3 a
7	4.18 a	0.62 a	5.27 a	0.24 a	46.5 a	2.68 a	0.35 a	2.21 a	0.20 a	23.0 a
8	4.23 a	0.62 a	5.56 a	0.24 a	45.3 a	2.68 a	0.35 a	2.13 a	0.19 a	23.3 a
LSD (P = 0.05)	0.18	0.06	0.43	0.02	3.86	0.24	0.03	0.19	0.03	2.5
C.V. (%)	2.90	6.30	5.40	6.00	5.7	6.40	6.3	6.00	9	7.2

Planting Date = May 16; Harvest Date = November 5; Previous Crop = Soybean

[3] Means followed by same letter are not significantly different (P = 0.05).

Table of Contents Home page

2013 Irrigated Potato Starter Fertilizer Trial

H. Hatterman-Valenti and C. Auwarter

This study was conducted at the Oakes Irrigation Research Site to evaluate various rates of in-furrow starter fertilizer on Russet Burbank potato. Plots were 4 rows by 17 feet arranged in a randomized complete block design with four replicates. Starter fertilizer, fert-A and fert-B, was tank-mixed and applied at different rates (shown below). There was also a grower standard application with 10-34-0 at 25 gal/ac and an untreated that didn't receive any starter fertilizer. Soil tests taken prior to trial showed 22 lbs N, 15 ppm P, and 140 ppm K. Pre-plant applications of 50 lbs N as 46-0-0 and 200 lbs K (grower standard application, treatment 2) and 140 lbs K (treatments 3-6) as 0-0-60 were applied and incorporated on May 15, 2013. Closing disks were removed from the planter as we planted potatoes to expose seed piece in-furrow and applied starter fertilizer. In addition to fert-A and fert-B, 28-0-0 was tank mixed to bring the total N to 100 lbs in each treatment. At this point, 100 lbs N, various lbs P and 200 lbs K were applied in treatment 2, and 140 lbs K were applied in treatments 3-6. Fifty lbs N/ac was stream-bar applied on June 6 and July 11 as 28-0-0. Thirty-four lbs N/ac was stream-bar applied on July 20 as 28-0-0. The stream-bar applied N treatments were immediately irrigated with 0.30" water. Potatoes were harvested October 29 with a single-row digger and graded in Fargo.

Fertilizer applications:

A = 5/15/13 – Treatments 1-6 @ Pre-plant
B = 5/15/13 – Treatments 2-6 @ Planting
C = 6/6/13 – Treatments 1-6 @ Tuber hooking
D = 7/11/13 – Treatments 1-6 @ Early tuber bulking
E = 7/20/13 – Treatments 1-6 @ Tuber bulking

All treatments had total yields over 400 CWT/ac. The highest yielding treatment had the highest amount of fert-A at 20 gal/ac (trt 5) with a total yield of 484 CWT/ac. The lowest yielding treatment was the grower's standard practice (trt 2) with 413 CWT/ac. Treatments 4 and 5 were the only treatments with over 400 CWT/ac of marketable tubers. These two treatments also had the most harvested tubers with 133 and 137 in 20 ft of row, respectively.

Table of Contents Home page

Table 1. Treatments and yield data in the 2013 Irrigated Starter Fertilizer Trial.

Trt Name	Form Conc	Rate/ Unit	App Code	Total	ounces 0-4	4-6	6-10	>10	>4	Total	ounces 0-4	4-6	6-10	>10
				----------CWT/ac----------						--Tuber Count in 20 feet--				
1 N	28%	50 lb ai/a	A	431	36	41	139	216	395	120	39	18	35	28
N	28%	50 lb ai/a	C											
N	28%	50 lb ai/a	D											
N	28%	34 lb ai/a	E											
2 N	46%	50 lb ai/a	A	413	37	44	131	200	375	120	41	19	33	27
K	60%	200 lb ai/a	A											
10-34-0	10,34%	25 gal/a	B											
N	28%	50 lb ai/a	C											
N	28%	50 lb ai/a	D											
N	28%	34 lb ai/a	E											
3 N	46%	50 lb ai/a	A	418	31	39	146	202	386	118	37	17	37	27
K	60%	140 lb ai/a	A											
Fert-A[1]	na	15 gal/a	B											
Fert-B[1]	na	3 gal/a	B											
N	28%	50 lb ai/a	C											
N	28%	50 lb ai/a	D											
N	28/%	34 lb ai/a	E											
4 N	46%	50 lb ai/a	A	469	39	54	155	222	431	133	42	24	39	28
N	60%	140 lb ai/a	A											
Fert-A[1]	na	10 gal/a	B											
Fert-B[1]	na	2 gal/a	B											
N	28%	50 lb ai/a	C											
N	28%	50 lb ai/a	D											
N	28%	34 lb ai/a	E											
5 N	46%	50 lb ai/a	A	484	37	40	175	232	446	137	42	18	45	32
K	60%	140 lb ai/a	A											
Fert-A[1]	na	20 gal/a	B											
Fert-B[1]	na	3 gal/a	B											
N	28%	50 lb ai/a	C											
N	28%	50 lb ai/a	D											
N	28%	34 lb ai/a	E											
6 N	46%	50 lb ai/a	A	428	39	39	130	221	390	120	41	17	33	29
K	60%	140 lb ai/a	A											
Fert-A[1]	na	10 gal/a	B											
Fert-B[1]	na	5 gal/a	B											
N	28%	50 lb ai/a	C											
N	28%	50 lb ai/a	D											
N	28%	34 lb ai/a	E											
LSD (P = 0.05)				222	20	23	89	131	214	57	21	10	23	19

[1] Fert –A & B – Confidential data.

Table of Contents Home page

Metribuzin and Rimsulfuron for Eastern Black Nightshade Weed Control on Potato

H. Hatterman-Valenti and C. Auwarter

This study was conducted at the Oakes Irrigation Research Site near Oakes, ND, to evaluate different rates of metribuzin and rimsulfuron applied POST (B-E) on Russet Burbank potatoes for eastern black nightshade control. Some treatments received a PRE (A) application of flumioxazin tank mixed with metribuzin at a rate of 0.3875 oz and 0.6 lb/ac. Corn was grown during 2012. Plots were 4 rows by 20 ft arranged in a randomized complete block design with four replicates. Seed pieces (2 oz) were planted on 36-inch rows and 12-inch spacing on May 15, 2013. Potatoes were harvested on October 29. Spray applications, yield data and weed control ratings are listed below.

Table 1. Application details.

Date:		6/14/2013	6/22/2013	7/1/2013	7/8/2013	7/16/2013
Timing:		A	B	C	D	E
Sprayer:	GPA:	20	20	20	20	20
	PSI:	40	40	40	40	40
	Nozzle:	8002	8002	8002	8002	8002
Air Temp. (F):		81	74	83	80	82
Rel. Hum. (%):		51	81	35	54	63
Wind (MPH):		11	9	4	5	9

Table 2. Yield data.

Trt No	Row A	Row B	Row A	Row B
	----------20'----------		----------CWT/ac----------	
1	59.80	63.90	434.2	463.9
2	74.00	74.63	537.2	541.8
3	73.75	74.15	535.4	538.3
4	76.53	81.58	555.6	592.3
5	59.73	67.65	433.6	491.1
6	62.43	72.15	453.2	523.8
7	69.40	67.33	503.8	488.8
8	68.68	74.03	498.6	537.5
9	67.35	69.90	489	507.5
LSD (P = 0.05)	13.59	14.70	98.7	106.7

PRE applications of flumioxazin tank mixed with metribuzin had better weed control 14 days after application (DAA) A and 6 DAA B. Applying a single application of metribuzin at 1.5 oz/ac tank mixed with Matrix at 0.5 lb/ac did just as well as multiple applications of the same tank mix and same amount of total product throughout the trial. The untreated had the lowest yield while the highest yielding treatment had three applications of metribuzin at 0.5 oz/ac tank mixed with Matrix at 0.167 lb/ac.

Table of Contents Home page

Table 3. Treatments and weed control ratings.

Trt No.	Trt Name	Rate	Rate/ Unit	App	% Control											
					----------6/28/2013----------				----------7/16/2013----------				----------8/14/2013----------			
					COLQ[1]	RRPW[2]	EBNS[3]	GRFT[4]	COLQ	RRPW	EBNS	GRFT	COLQ	RRPW	EBNS	GRFT
1	Untreated				0 c	0 c	0 d	0 b	0 b	0 b	0 b	0 c	0 b	0 b	0 b	0 b
2	Class Act NG	2.5	%v/v	B	93 ab[5]	94 ab	90 c	99 a	100 a	100 a	99 a	100 a	95 a	100 a	98 a	100 a
	Metribuzin	1.5	oz/A	B												
	Matrix	0.5	lb/A	B												
3	Class Act NG	2.5	%v/v	B	85 b	94 ab	93 bc	98 a	91 a	100 a	93 a	100 a	96 a	100 a	100 a	99 a
	Metribuzin	0.75	oz/A	B												
	Matrix	0.25	lb/A	B												
	Class Act NG	2.5	%v/v	D												
	Metribuzin	0.75	oz/A	D												
	Matrix	0.25	lb/A	D												
4	Class Act NG	2.5	%v/v	B	91 ab	94 ab	93 bc	99 a	95 a	100 a	98 a	100 a	98 a	100 a	100 a	100 a
	Metribuzin	0.5	oz/A	B												
	Matrix	0.167	lb/A	B												
	Class Act NG	2.5	%v/v	C												
	Metribuzin	0.5	oz/A	C												
	Matrix	0.167	lb/A	C												
	Class Act NG	2.5	%v/v	D												
	Metribuzin	0.5	oz/A	D												
	Matrix	0.167	lb/A	D												
5	Class Act NG	2.5	%v/v	B	85 b	90 b	89 c	98 a	95 a	100 a	98 a	100 a	98 a	99 a	100 a	98 a
	Metribuzin	0.375	oz/A	B												
	Matrix	0.125	lb/A	B												
	Class Act NG	2.5	%v/v	C												
	Metribuzin	0.375	oz/A	C												
	Matrix	0.125	lb/A	C												
	Class Act NG	2.5	%v/v	D												
	Metribuzin	0.375	oz/A	D												
	Matrix	0.125	lb/A	D												
	Class Act NG	2.5	%v/v	E												
	Metribuzin	0.375	oz/A	E												
	Matrix	0.125	lb/A	E												
	LSD (P = 0.05)				7.05	4.15	4.62	3.08	7.66	0	7.55	1.4	5.25	1.22	2.43	3

Table 3. Treatments and weed control ratings (continued).

Trt No.	Trt Name	Rate	Rate/ Unit	App	% Control 6/28/2013 COLQ	6/28/2013 RRPW	6/28/2013 EBNS	6/28/2013 GRFT	7/16/2013 COLQ	7/16/2013 RRPW	7/16/2013 EBNS	7/16/2013 GRFT	8/14/2013 COLQ	8/14/2013 RRPW	8/14/2013 EBNS	8/14/2013 GRFT
6	Chateau	0.75	oz/A	A	99 a	100 a	98 ab	100 a	95 a	100 a	95 a	98 b	100 a	100 a	100 a	99 a
	Metribuzin	0.6	lb/A	A												
	Class Act NG	2.5	%v/v	B												
	Metribuzin	0.75	oz/A	B												
	Matrix	0.25	lb/A	B												
7	Chateau	0.75	oz/A	A	100 a	96 a	94 bc	100 a	100 a	100 a	100 a	100 a	100 a	100 a	100 a	100 a
	Metribuzin	0.60	lb/A	A												
	Class Act NG	2.50	%v/v	B												
	Metribuzin	0.75	oz/A	B												
	Matrix	0.25	lb/A	B												
	Class Act NG	2.50	%v/v	D												
	Metribuzin	0.75	oz/A	D												
	Matrix	0.25	lb/A	D												
8	Chateau	0.75	oz/A	A	100 a	99 a	100 a	100 a	100 a	100 a	100 a	100 a	100 a	100 a	100 a	100 a
	Metribuzin	0.60	lb/A	A												
	Class Act NG	2.50	%v/v	B												
	Metribuzin	0.75	oz/A	B												
	Matrix	0.25	lb/A	B												
	Class Act NG	2.50	%v/v	C												
	Metribuzin	0.75	oz/A	C												
	Matrix	0.25	lb/A	C												
	Class Act NG	2.50	%v/v	D												
	Metribuzin	0.75	oz/A	D												
	Matrix	0.25	lb/A	D												
	LSD (P = 0.05)				7.05	4.15	4.62	3.08	7.66	0	7.55	1.4	5.25	1.22	2.43	3

Table of Contents Home page

Table 3. Treatments and weed control ratings (continued).

Trt No.	Trt Name	Rate	Rate/ Unit	App	% Control 6/28/2013 COLQ	6/28/2013 RRPW	6/28/2013 EBNS	6/28/2013 GRFT	7/16/2013 COLQ	7/16/2013 RRPW	7/16/2013 EBNS	7/16/2013 GRFT	8/14/2013 COLQ	8/14/2013 RRPW	8/14/2013 EBNS	8/14/2013 GRFT
9	Chateau	0.75	oz/A	A	98 a	98 a	94 bc	100 a	100 a	100 a	100 a	100 a	100 a	100 a	100 a	100 a
	Metribuzin	0.60	lb/A	A												
	Class Act NG	2.50	%v/v	B												
	Metribuzin	0.75	oz/A	B												
	Matrix	0.25	lb/A	B												
	Class Act NG	2.50	%v/v	C												
	Metribuzin	0.75	oz/A	C												
	Matrix	0.25	lb/A	C												
	Class Act NG	2.50	%v/v	D												
	Metribuzin	0.75	oz/A	D												
	Matrix	0.25	lb/A	D												
	Class Act NG	2.50	%v/v	E												
	Metribuzin	0.75	oz/A	E												
	Matrix	0.25	lb/A	E												
	LSD (P = 0.05)				7.05	4.15	4.62	3.08	7.66	0	7.55	1.4	5.25	1.22	2.43	3

[1] COLQ = Common lambsquarter.

[2] RRPW = Redroot Pigweed.

[3] EBNS = Eastern black nightshade.

[4] GRFT = Green foxtail.

[5] Data followed by different letters are significantly different at P < 0.05.

Table of Contents Home page

Russet Burbank In-furrow Fertilizer Trial

H. Hatterman-Valenti and C. Auwarter

This study was conducted at the Oakes Irrigation Research Site near Oakes, ND, to evaluate rates of in-furrow fertilizer on Russet Burbank potato. Soil tests showed 22 lbs N, 15 ppm P (high on the Olsen soil test method), and 140 K (high on the Olsen soil test method). Corn was grown during 2012. Plots were 4 rows by 20 ft arranged in a randomized complete block design with four replicates. 50 lbs N as 46-0-0 and 50 lbs K as 0-0-60 was pre-plant incorporated prior to planting on entire plot. Seed pieces (2 oz) were planted on 36-inch rows and 12-inch spacing on May 15, 2013. Fertilizer was applied in-furrow at 15 gpa as a stream on both sides of the seed piece.

After planting:

Treatment 1: 102 lbs N (22 lb soil test, 50 lb ppi, 30 lb @ plant as 28-0-0), 0 P

Treatment 2: 105.4 lbs N, 110.5 lbs P (3.6 lb as WC139, 106.9 lb as 10-34-0)

Treatment 3: 104.3 lbs N, 105.1 lbs P

Treatment 4: 101.4 lbs N, 91.3 lbs P

Treatment 5: 104.5 lbs N, 118.8 lbs P

Treatment 6: 102 lbs N + WC041 @ 1 lb/ac

Maintenance sprays, hilling, irrigation and additional N were applied as needed. N was applied once in late June and late July at 50 lbs each time. Fifty percent emergence occurred on June 7 (23 DAP) among all treatments. Each plot was four rows; however, fertilizer was only applied on the middle two rows. Fifty percent row closure occurred on July 16 (62 DAP). Potatoes were harvested on October 29 and graded November 19.

The highest yielding treatment occurred with 5 gal/ac WCI139 (6.1 lbs P) + 25 gal/ac 10-34-0 (99 lbs P) (treatment 3) with a total yield of 544 cwt/ac. The lowest yielding treatment was treatment 1 with no P applied, at 396 cwt/ac. Marketable yield (>4oz) showed the same trend with treatment 3 having the highest (504 cwt/ac) and treatment 1 the least (364 cwt/ac).

Tuber counts in 20 feet of row showed treatment 3 with the highest count (154 tubers) and treatment 1 with the least (111 tubers). Treatment 2, 3 gal/ac WCI139 (3.6 lbs P) + 27 gal/ac 10-34-0 (106.9 lbs P) had the second lowest number of tubers with 123 tubers. Treatments 4-6 had between 143 and 148 tubers. Treatment 3 also had the highest percentage of marketable tubers with 72% of all tubers being greater than 4 oz. Treatment 6, 1 lb/ac WCI041 had the lowest percentage of marketable tubers with only 64% of all tubers being marketable. Treatment 1 had 67% marketable tubers.

Table of Contents Home page

Stoller Corn Study

W. Albus, R. Dodds, L. Besemann and H. Eslinger

MATERIALS AND METHODS

Soil:	Maddock sandy loam, Hecla sandy loam and Embden sandy loam; pH = 7.1; 1.7 % organic matter, soil N 27 lbs/acre soil K were very high; soil S was high.
Previous crop:	2012 – soybean.
Seedbed preparation:	Spring conventional tillage.
Planting:	May 17, DeKalb DKC-49-29 in 30-inch rows.
Plots:	Plots were 40 ft long by 10 ft (4 rows) wide. The study had six replications.
Treatments:	**Trt 1** = check; **trt 2** = Bio-Forge 16 oz/acre @ V6 (June 25); **trt 3** = Bio-Forge 8 oz/acre @ V6 (June 25) and Bio-Forge 8 oz/acre @ R1 (July 31); **trt 4** = check; **trt 5** = Bio-Forge 8 oz/acre in-furrow @ planting (May 17), Bio-Forge 8 oz/acre @ V6 (June 25) and X-Cyte 16 oz/acre; V9 (July 8); **trt 6** = Bio-Forge 8 oz/acre in-furrow @ planting (May 17), Bio-Forge 8 oz/acre @ V6 (June 25), X-Cyte 16 oz/acre; V9 (July 8) and Sugar Mover 16 oz/acre @ R1 (July 31).
Fertilizer:	Broadcast 9 lbs N/acre, 42 lbs P_2O_5/acre, 36 lbs K_2O/acre, 5 lbs S/acre and 2 lbs Zn/acre. Three lbs N/acre and 10 lbs P_2O_5/acre in furrow as 10-34-0 May 17. Stream bar 60 lbs N/acre May 25 and side dress 180 lbs N/acre as 28-0-0 June 25.
Irrigation:	Overhead sprinkler irrigation as needed.
Pest control:	Outlook (18 oz/acre) May 23, Laudis (3 oz/acre) + Roundup Power Max (40 oz/acre) + AAtrex 9-0 (0.5 lb ai/acre) + Destiny (0.05 %v/v) + AMS (1½ lb/acre) June 11.
Harvest:	November 5 with a plot combine. Harvest area was the center two rows, 36 feet long.

Table 1. Treatments for the Stoller corn study at the Oakes Irrigation Research Site in 2013.

Trt No.	
1	Check
2	Bio-Forge 16 oz/ac, V6
3	Bio-Forge 8 oz/ac, V6; Bio-Forage 8 oz/ac, R1
4	Check
5	Bio-Forge 8 oz/ac, In-Furrow; Bio-Forge 8 oz/ac, V6; X-Cyte 16 oz/ac, V9
6	Bio-Forge 8 oz/ac, In-Furrow; Bio-Forge 8 oz/ac, V6; X-Cyte 16 oz/ac, V9; Sugar Mover 16 oz/ac, R1

Table of Contents Home page

Table 2. Agronomic data for the Stoller corn study at the Oakes Irrigation Research Site in 2013.

Treatment	Yield	Harvest Moisture	Test Weight	Silk Date	Ear Height	Tassel Height	Grain Oil	Grain Protein	Grain Starch	Chlorophyll meter[1] Reading	Chlorophyll meter[1] Reading	NDRE[2]
	bu/ac	%	lb/bu		inches	inches	%	%	%	12-Jul	6-Aug	6-Aug
1	229.1 a	22.3 a	52.8 a	7/29 a	46.2 a	102.9 a	3.6 a	9.3 a	72.1 a	41.2 a	49.6 a	0.36 a
2	228.8 a	21.9 a	52.6 a	7/29 a	46.1 a	103.8 a	3.7 a	9.2 a	71.9 a	42.9 a	49.9 a	0.35 a
3	228.3 a	21.9 a	53.0 a	7/29 a	45.8 a	103.5 a	3.5 a	9.3 a	72.3 a	41.3 a	50.9 a	0.36 a
4	230.3 a	22.0 a	52.8 a	7/29 a	45.5 a	104.0 a	3.6 a	9.3 a	72.0 a	41.0 a	49.0 a	0.36 a
5	230.3 a	21.8 a	52.6 a	7/29 a	45.6 a	102.5 a	3.5 a	9.2 a	72.2 a	42.1 a	50.9 a	0.35 a
6	232.6 a	21.8 a	52.5 a	7/28 a	44.9 a	102.5 a	3.7 a	9.2 a	72.0 a	43.8 a	49.7 a	0.36 a
LSD (P = 0.05)	8.0	0.5	1.1	0.8	1.0	1.6	0.3	0.2	0.7	3.4	2.6	0.010
C.V. (%)	2.9	1.8	1.7	0.0	1.8	1.3	7.1	1.7	0.8	6.8	4.3	2.440

Planting Date = May 17; Harvest Date = November 5; Previous Crop = Soybean

Means followed by same letter do not significantly differ (P = 0.05).

[1] Opti-Science CCM 200.

[2] Holland Crop Circle ACS active canopy sensor (normalized difference red edge - NDRE).

Table of Contents Home page

Table 2. Agronomic data for the Stoller corn study at the Oakes Irrigation Research Site in 2013.

	24-Jun V5.5L Plant Tissue Samples					5-Aug R1 Ear Leaf Tissue Samples				
Treatment	N	P	K	S	Zn	N	P	K	S	Zn
	%	%	%	%	ppm	%	%	%	%	ppm
1	3.78 a	0.60 a	5.11 a	0.22 a	51.7 a	2.62 a	0.35 a	2.10 a	0.19 a	26.30 a
2	3.78 a	0.59 a	4.77 a	0.22 a	52.2 a	2.65 a	0.34 a	2.11 a	0.19 a	26.30 a
3	3.77 a	0.55 a	4.54 a	0.22 a	50.7 a	2.62 a	0.34 a	2.06 a	0.19 a	29.00 a
4	3.75 a	0.56 a	4.63 a	0.21 a	50.2 a	2.50 a	0.34 a	2.12 a	0.18 a	26.00 a
5	3.62 a	0.56 a	4.78 a	0.22 a	51.8 a	2.50 a	0.34 a	2.18 a	0.19 a	27.00 a
6	3.76 a	0.59 a	4.69 a	0.21 a	50.4 a	2.53 a	0.34 a	2.02 a	0.19 a	26.90 a
LSD (P = 0.05)	0.21	0.05	0.37	0.02	3.42	0.227	0.03	0.12	0.02	2.7
C.V. (%)	4.77	7.84	6.54	7.34	5.6	7.38	8.01	4.66	7.20	8.5

Planting Date = May 17; Harvest Date = November 5; Previous Crop = Soybean

Means followed by same letter do not significantly differ (P = 0.05).

Table of Contents Home page

Soybean Stoller Study

W. Albus, R. Dodds, L. Besemann and H. Eslinger

MATERIALS AND METHODS

Soil:	Maddock sandy loam and Egeland loam; 2.2% organic matter, soil N 79 lbs/acre, soil P and soil K were very high; soil-S was medium.
Previous crops:	2012 – barley and wheat.
Seedbed preparation:	Spring conventional tillage.
Planting:	May 28, Croplan R2T 1041 in 30-inch rows.
Plots:	Plots were 40 ft long by 10 ft wide. The study had six replications.
Treatments:	**Trt 1** = check; **trt** 2 = Bio-Forge 8 oz/acre @ V4-V5 July 8 and Bio-Forge 8 oz/acre @ R3 August 1; **trt 3** = Bio-Forge 16 oz/acre @ R3 August 1.
Fertilizer:	Broadcast 34 lbs N/acre, 81 lbs P_2O_5/acre, 103 lbs K_2O/acre, 19 lbs S/acre May 1.
Irrigation:	Overhead sprinkler irrigation as needed.
Pest control:	Trust (1 pt/acre) May 28, Roundup Power Max (30 oz/acre) + AMS (1 lb/10 gal) June 24 and Roundup Power Max (40 oz/acre) + AMS (1 lb/10 gal) July 16.
Harvest:	October 22 with a plot combine. Harvest area was the center two rows, 37 feet long.

Table 1. Agronomic data for the Stoller soybean study at the Oakes Irrigation Research Site 2013.

	Yield[1]	Harvest Moisture	Test Weight	Lodging Score[2]	Height	Protein	Oil
	bu/ac	%	lb/bu		inch	%	%
Check	62.2 a	14.9 a	56.5 a	1.7 a	37.2 a	36.3 a	17.9 a
Bio-Forge 8 oz/ac; V4-V6 & R3	64.0 a	14.9 a	56.5 a	1.8 a	37.3 a	36.2 a	18.0 a
Bio-Forge 16 oz/ac; R3	63.5 a	14.6 a	56.7 a	1.8 a	38.0 a	36.2 a	17.9 a
LSD (P = 0.05)	2.9	1.1	0.6	0.9	0.9	0.2	0.2
C.V. (%)	3.6	5.9	0.8	40.7	1.9	0.5	1.0
Grand Mean	63.2	14.8	56.6	1.8	37.5	36.2	17.9

Planting Date = May 28; Harvest Date = October 22; Previous Crop = Barley and spring wheat

[1] Yield adjusted to 13.0 % moisture.

[2] 0 = erect, 9 = flat.

Table of Contents Home page

Strip-Till, Corn on Corn, Nitrogen Rate Study

L. Besemann and H. Eslinger

MATERIALS AND METHODS

Soil:	Embden sandy loam and Helca sandy loam; soil N average 8 lbs/acre.
Previous crop:	2012 - field corn.
Seedbed preparation:	Strip-till May 17 with an Orthman strip-till machine.
Hybrid:	Pioneer P9917 AMI.
Planting:	Planted May 23 in 30-inch rows @ 33,000 seeds/acre.
Plots:	Plots were 137 ft long by 20 ft (8 rows) wide. There were four replications.
Fertilizer:	All plots received a broadcast application of 31 lbs N/acre, 103 lbs P_2O_5/acre, 95 lbs K_2O/acre, 26 lbs S/acre, and 3 lbs Zn/acre as 7-25-23-6-1 May 7. All plots received 12 lbs N/acre and 40 lbs P_2O_5/acre as 10-34-0 via strip-till May 17. Stream-bar all plots 10 lbs N/acre and 23 lbs S/acre as 12-0-0-26 May 23. Stream-bar 79 lbs N/acre as 28-0-0 to the 100 and 150 lb treatments and 44 lbs N/acre as 28-0-0 to the 150D and 200 lb treatments May 23. Sidedress N treatments as 28-0-0 (three inches deep) June 17 and June 18; the 150 lb treatments received 50 lbs N/acre, the 150D received 85 lbs N/acre and the 200 lb treatments received 135 lbs N/acre.
Irrigation:	Hand move sprinkler irrigation as needed.
Pest control:	Outlook (18 oz/acre) May 23, Laudis (3 oz/acre) + Roundup Power Max (40 oz/acre) + AAtrex 9-O (0.5 lb ai/acre) + Destiny (0.05%v/v) + AMS (1½ lbs/acre) June 13.
Remote sensing:	Remote sensing was achieved with an Opti-Sciences CCM 200 Plus chlorophyll meter and a Holland Crop Circle ACS active canopy sensor (normalized difference red edge – NDRE).
Harvest:	October 24 with a JD 4400 combine. Harvest area was the middle four rows of each plot, 137 feet long.

RESULTS

Determining nitrogen sufficiency in time is important to achieve N efficiency. Remote sensing utilizing a Holland Crop Circle ACS 430 active canopy sensor (normalized difference red edge – NDRE) and a Opti-Science CCM 200 chlorophyll meter were tested to determine ability to measure N sufficiency.

Increasing nitrogen rates (N) increased grain yield, chlorophyll meter readings and normalized difference red edge (NDRE). Remote sensing by chlorophyll meter and the Crop Circle Sensor did well in predicting corn N status.

Table of Contents Home page

Table 1. Strip-till, corn on corn nitrogen rate study at the Oakes Irrigation Research Site in 2013.

Fertilizer N Rate	Grain Yield[1]	Grain Yield 2009-13	Harvest Moisture	Test Weight	Chlorophyll Meter Reading[2]	NDRE[3]	Nitrate-N		Seed Oil	Seed Protein	Seed Starch	Emerge Date	Silk Date	Mature Date[4]
							Stalk	Fall Soil						
lb/acre	bu/ac		%	lb/bu	6-Aug	5-Aug	ppm	lbs	----------%----------					
22	78.2	84.1	20.0	53.1	13.6	0.1628	180	17	3.4	7.2	74.9	5/30	31-Jul	258.8
100	146.8	173.1	22.5	52.0	28.6	0.2757	236	22	3.7	7.9	74.1	5/30	29-Jul	263.3
150	176.3	191.2	22.5	52.0	42.1	0.2971	415	23	3.6	8.2	73.9	5/30	29-Jul	264.0
150 D	183.2	203.9	22.4	52.2	42.7	0.2909	281	25	3.5	8.1	73.8	5/30	29-Jul	263.5
200	205.6	215.7	23.1	51.7	49.8	0.3177	736	23	3.5	8.5	73.6	5/30	28-Jul	265.3
Mean	158.0		22.1	52.2	35.4	0.2689	370	22	4	8	74.0			263.0
C.V. (%)	4.6		1.7	1.2	6.6	5.3	67.4	21.9	8.6	2.2	0.7			0.3
LSD 0.10	9.3		0.5	0.8	3.0	0.0179	314	NS	NS	0.2	0.6			0.9
LSD 0.05	11.3		0.6	NS	3.6	0.0219	NS	NS	NS	0.3	0.8			1.2

Planting Date = May 17; Harvest Date = October 24; Previous Crop = Corn

[1] Yield adjusted to 15.5% moisture.

[2] Opti-Science CCM 200.

[3] Holland Crop Circle ACS active canopy sensor (normalized difference red edge) - NDRE.

[4] Mature date; 259 = September 15.

Table of Contents Home page

Strip-Till, Corn on Soybean, Nitrogen Rate Study

L. Besemann and H. Eslinger

The objective of this study was to compare corn yields of a corn/soybean rotation to those in a companion corn/corn rotation and to find differences in N response and other agronomic measurements in no-till rotations, utilizing strip-till.

MATERIALS AND METHODS

Soil:	Embden sandy loam, Embden loam, Gardena loam and Maddock sandy loam. Soil N average 14 lbs/acre.
Previous crop:	2012 – soybean.
Seedbed preparation:	Strip-till May 18 with an Orthman strip-till machine.
Hybrid:	Pioneer P0062AMX
Planting:	Planted May 18 @ 33,000 plants per acre in 30-inch rows.
Plots:	Plots were 37 ft long by 15 ft (6 rows) wide. There were four replications.
Fertilizer:	All plots received a broadcast application of 31 lbs N/acre, 103 lbs P_2O_5/acre, 95 lbs K_2O/acre, 26 lbs S/acre, and 3 lbs Zn/acre as 7-25-23-6-1 May 2. All plots received 12 lbs N/acre and 40 lbs P_2O_5/acre as 10-34-0 via strip-till May 18. Stream-bar all plots with 10 lbs N/acre and 23 lbs S/acre as 12-0-0-26 May 23. Stream-bar 79 lbs N/acre as 28-0-0 to the 100 lb treatment and 44 lbs N/acre as 28-0-0 to the 100D, 150 and 200 lb treatments May 25. Sidedress N treatments as 28-0-0 (three inches deep) June 18; 200 lb treatments received 135 lbs N/acre, the 150 lb treatment received 85 lbs N/acre and the 100D received 35 lbs N/acre.
Irrigation:	Overhead sprinkler irrigation as needed.
Pest control:	Outlook (18 oz/acre) May 23, Laudis (3 oz/acre) + Roundup Power Max (40 oz/acre) + AAtrex 9-O (0.5 lb ai/acre) + Destiny (0.05%v/v) + AMS (1½ lbs/acre) June 13.
Remote sensing:	Remote sensing was achieved with an Opti-Sciences CCM 200 Plus chlorophyll meter and a Holland Crop Circle ACS active canopy sensor (normalized difference red edge – NDRE).
Harvest:	Hand harvest October 16 - October 18. Harvest area was the two center rows from each plot (72 feet of total row).

RESULTS

Determining nitrogen sufficiency in time is important to achieve N efficiency. Remote sensing utilizing a Holland Crop Circle ACS 430 active canopy sensor (normalized difference red edge – NDRE) and a Opti-Science CCM 200 chlorophyll meter were tested to determine ability to measure N sufficiency.

Increasing nitrogen rates (N) increased grain yield, chlorophyll meter readings and normalized difference red edge (NDRE). Remote sensing by chlorophyll meter and the Crop Circle Sensor did well in predicting corn N status.

Table of Contents Home page

Table 1. Strip-till, corn on soybean nitrogen rate study at the Oakes Irrigation Research Site in 2013.

Fertilizer N Rate	Grain Yield[1]	Grain Yield 2009-13	Harvest Moisture	Test Weight	Chlorophyll Meter Reading[2]	NDRE[3]	Nitrate-N		Population	Seed			Emerge Date	Silk[4] Date	Mature Date
							Stalk	Fall Soil		Oil	Protein	Starch			
lb/acre	bu/ac	bu/ac	%	lb/bu	6-Aug	5-Aug	ppm	lbs	plants/ac	----------%----------					
22	158.8	129.4	24.4	46.6	18.4	0.3114	71	19	34848	1.7	6.9	76.5	31-May	211.3	22-Sep
100	200.7	185.0	24.3	47.2	27.3	0.3310	342	21	35613	2.0	7.5	75.6	31-May	210.8	23-Sep
100 D	216.9	194.9	23.6	47.4	32.4	0.3170	137	21	36084	2.1	7.9	75.2	31-May	211.8	23-Sep
150	242.9	227.0	23.4	47.6	37.4	0.3270	1026	24	35849	2.0	8.3	74.8	31-May	212.0	23-Sep
200	245.3	236.1	23.2	48.2	40.8	0.3234	1903	28	35672	2.1	8.7	74.6	31-May	211.0	23-Sep
Mean	212.9		23.8	47.4	31.3	0.3220	696	22.6		2.0	7.9	75.3		211.4	
C.V. %	5.1		2.7	0.9	9.7	9.2	63.4	9.3		10.3	3.1	0.5		0.5	
LSD 0.10	13.6		0.8	0.5	3.8	NS	556	2.6		0.3	0.3	0.5		NS	
LSD 0.05	16.6		NS	0.6	4.7	NS	679	3.2		NS	0.4	0.6		NS	

Planting Date = May 18; Harvest Date = October 17; Previous Crop = Soybean

[1] Yield adjusted to 15.5% moisture.

[2] Opti-Science CCM 200.

[3] Holland Crop Circle ACS active canopy sensor (normalized difference red edge) - NDRE.

[4] Jday of Silk: Julian day of year when hybrids reached 50% silk. Example: Jday 211 = July 30.

Table of Contents Home page

Strip-Till, Soybean on Corn Study

L. Besemann and H. Eslinger

MATERIALS AND METHODS

Soil:	Embden sandy loam, Hecla sandy loam and Maddock sandy loam.
Previous crop:	2012 – field corn.
Seedbed preparation:	Strip-till May 18 with an Orthman strip-till machine.
Hybrid:	Pioneer 91Y30.
Planting:	May 27 @ 205,000 plants per acre in 30 inch rows.
Plots:	Plots were 37 ft long by 15 ft (6 rows) wide. There were four replications.
Fertilizer:	All plots received a broadcast application of 31 lbs N/acre, 103 lbs P_2O_5/acre, 95 lbs K_2O/acre, 26 lbs S/acre, and 3 lbs Zn/acre as 7-25-23-6-1 May 3. All plots received 12 lbs N/acre and 40 lbs P_2O_5/acre as 10-34-0 via strip-till May 18.
Irrigation:	Overhead sprinkler irrigation as needed.
Pest control:	Roundup Power Max (30 oz/acre) + AMS (1 lb/10 gal) June 24 and Roundup Power Max (40 oz/acre) + AMS (1 lb/10 gal) July 16. Section 2EC (8 oz/acre) + COC (1.0 % v/v) July 5 controlled weeds. Proline (5 oz/acre) July 18, July 24 and August 1 for disease control. Kendo (3½ oz/acre) July 24 for insect control.
Harvest:	October 10 with a 4400 JD combine (60 rows 74 feet long, recorded with a weigh wagon).

RESULTS

All soybean plots were combine harvested and bulked. The soybean yield was 65.4 bu/acre at 13.3% moisture with a test weight of 55.7 lbs/bu.

Table of Contents Home page

Optimum Corn Stover Removal for Biofuels and the Environment

L. Besemann and H. Eslinger

The 2007 U.S. energy bill calls for 36 billion gallons of ethanol to be produced by 2020. In 2007 the U.S. produced 6.5 billion gallons of ethanol. If corn grain was able to supply 15 billion gallons of ethanol, 21 billion gallons of ethanol would have to come from cellulosic material (biomass) to meet the 2020 mandate. The production of 21 billion gallons of cellulosic ethanol will require 350 million tons of dry biomass. Presently, perennial grasses and corn stover are the most available. About 194 million tons of biomass is produced in U.S. production agriculture annually, with 75 million tons coming from corn stover. Therefore corn stover is being looked at to play a major role in cellulosic ethanol production.

Before we commit ourselves to using corn stover for fuel we need to study the environmental and economic consequences of this action. What effect will stover removal have on soil organic matter, soil erosion and ultimately sustainability of the land resource?

The objective of this study is to determine what rates of stover removal within different cropping systems are conducive to maintaining and possibly improving the productive capacity of the land while providing a renewable energy source.

MATERIALS AND METHODS

Rotations:	Block I: 2013 – field corn, 2012 – field corn, 2011 - field corn, 2010 - field corn, 2009 - field corn, 2008 – field corn, 2007 – field corn.
	Block II: 2013 – field corn, 2012 – soybean, 2011 - field corn, 2010 - soybean, 2009 - field corn, 2008 – soybean, 2007 – field corn.
	Block III: 2013 – soybean, 2012 – field corn, 2011 - soybean, 2010 - field corn, 2009 – soybean, 2008 – field corn, 2007 - onion.
Soil:	Embden sandy loam, Hecla sandy loam and Maddock sandy loam.
	Block I: soil N 34 lbs/acre.
	Block II: na.
	Block III: soil N 22 lbs/acre.
Seedbed preparation:	Strip-till May 18 with an Orthman strip-till machine.
Hybrid: Variety:	Corn: Wensman W7268 VT 3PRIB. Soybean: Syngenta S10-P9.
Planting:	Block I: Corn May 18 in 30-inch rows @ 33,000 seeds/acre.
	Block II: Corn May 18 in 30-inch rows @ 33,000 seeds/acre.
	Block III: Soybean May 28 in 30-inch rows @ 205,000 seeds/acre.

Table of Contents Home page

Fertilizer:	Block I: Broadcast 31 lbs N/acre, 103 lbs P_2O_5/acre, 95 lbs K_2O/acre, 26 lbs S/acre, and 3 lbs Zn/acre as 7-25-23-6-1 May 7. Twelve lbs N/acre and 40 lbs P_2O_5/acre as 10-34-0 via strip-till May 18. Stream-bar 10 lbs N/acre and 23 lbs S/acre as 12-0-0-26 May 23 and 60 lbs N/acre as 28-0-0 May 25. Sidedress 126 lbs N/acre June 18 and 60 lbs N/acre as 28-0-0 June 25. Block II: Broadcast 31 lbs N/acre, 103 lbs P_2O_5/acre, 95 lbs K_2O/acre, 26 lbs S/acre, and 3 lbs Zn/acre as 7-25-23-6-1 May 7. Twelve lbs N/acre and 40 lbs P_2O_5/acre as 10-34-0 via strip-till May 18. Stream-bar 10 lbs N/acre and 23 lbs S/acre as 12-0-0-26 May 23 and 60 lbs N/acre as 28-0-0 May 25. Sidedress 126 lbs N/acre June 18 and 60 lbs N/acre as 28-0-0 June 25. Block III: Broadcast 31 lbs N/acre, 103 lbs P_2O_5/acre, 95 lbs K_2O/acre, 26 lbs S/acre and 3 lbs Zn/acre as 7-25-23-6-1 May 7. Twelve lbs N/acre and 40 lbs P_2O_5/acre as 10-34-0 via strip-till May 18.
Irrigation:	Hand move sprinkler irrigation as needed.
Pest control:	Block I: Outlook (18 oz/acre) May 23, Laudis (3 oz/acre) + Roundup Power Max (40 oz/acre) + AAtrex 9-O (0.5 lb ai/acre) + Destiny (0.05%v/v) + AMS (1½ lbs/acre) June 13. Block II: Outlook (18 oz/acre) May 23, Laudis (3 oz/acre) + Roundup Power Max (40 oz/acre) + AAtrex 9-O (0.5 lb ai/acre) + Destiny (0.05%v/v) + AMS (1½ lbs/acre) June 13. Block III: Roundup Power Max (30 oz/acre) June 6, June 24 and July 2; Section 2EC (8 oz/acre) + NIS (0.2% v/v) + AMS (1 lb/10 gal) July 2.
Remote sensing:	Remote sensing was achieved with an Opti-Sciences CCM 200 Plus chlorophyll meter and a Holland Crop Circle ACS active canopy sensor (normalized difference red edge - NDRE).
Harvest:	Block I: Hand harvested the entire length (27 feet) of rows 5 and 8 from each plot on October 18 and October 21. Block II: Hand harvested the entire length (27 feet) of rows 5 and 8 from each plot on October 21. Block III: October 10 with a 4400 JD combine (48 rows 108 feet long, recorded with a weigh wagon).

Table of Contents Home page

RESULTS BLOCK I (Corn/Corn) - 2013

Corn stover was removed at the 33, 67 and 100 percent removal rates in block I (corn/corn rotation). Stover removal had no significant effect on grain yield, moisture and test weight. Stover removal had no effect on chlorophyll readings (Opti-Science CCM 200), Normalized Difference Red Edge (NDRE) indice (Holland Crop Circle ACS 430) and stalk nitrate-N (Table 1). Longer term data from 2009 to 2012 is presented in Table 2. The effect on revenue for the higher yield of the 100 percent removal rate compared to the 0 percent removal rate when the cost of N, P and K are accounted for is shown in Figure 1.

RESULTS BLOCK II (Corn/Soybean) - 2013

Stover removal rates of 33, 67, and 100 had no effect on grain yield, moisture or test weight (Table 3).

RESULTS BLOCK III (Soybean/Corn) - 2013

All soybean plots were combine harvested and bulked. The soybeans yielded 60.8 bu/acre at 13.9% moisture and had a test weight of 55.9 lbs/bu.

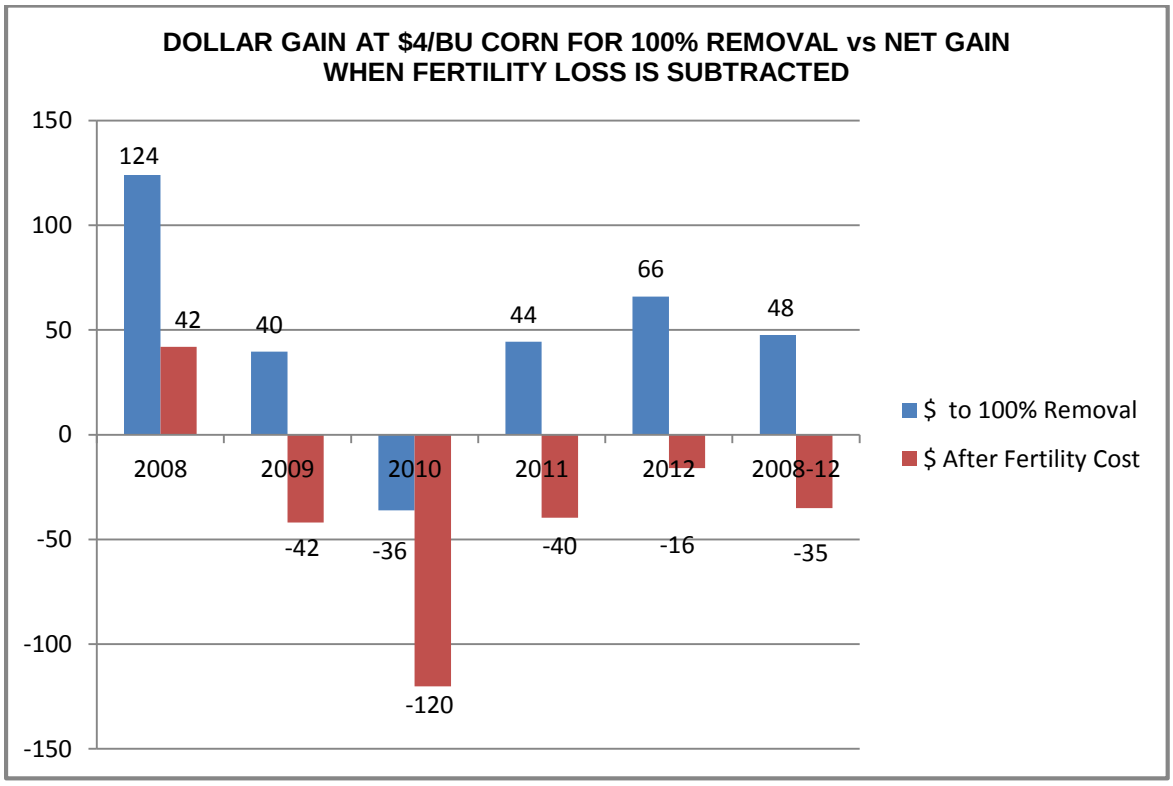


Figure 1. The net return when the fertility cost leaving the field is subtracted from the yield advantage in 100 percent removal plots compared to 0 percent removal plots for corn on corn from 2008 to 2012 at the Oakes Irrigation Research Site.

Table of Contents Home page

Table 1. The effect of corn stover removal rates on grain yield and other agronomic parameters for corn on corn plots in 2013.

Stover Removal	Grain Yield[1]	Grain Yield 2009-13	Harvest Moisture	Test Weight	Stalk DM Removal[2]	Stalk DM Removal 2008-13	Chlorophyll Meter Reading	NDRE	Population	Stalk Nitrate-N	Fall soil Nitrate-N
%	bu/ac		%	lb/bu	------ ton/ac ------		6-Aug	5-Aug	plants/ac	ppm	lbs
0	232.6	221.0	22.9	47.4	0.00	0.0	48.9	0.3606	31299	5897	30
33	242.8	224.4	21.8	48.4	2.08	2.4	55.1	0.3645	32589	10364	19
67	248.9	227.1	21.7	49.1	3.20	3.7	57.6	0.3656	31863	9578	24
100	249.0	226.9	21.6	48.7	4.38	5.5	59.2	0.3649	33073	11160	22
Mean	243.3		22.0	48.4	2.4		55.2	0.3639	32206	9249	24
C.V. (%)	3.5		2.9	1.2	18.5		3.1	1.3	2.3	26.6	28.1
LSD 0.10	11.2		0.8	0.8	0.6		2.2	NS	956	3185	NS
LSD 0.05	NS		NS	0.9	0.7		2.7	NS	1180	NS	NS

Stover Removal	Seed			Emerge Date	Silk Date[3]	Mature Date[3]	Nutrients in stover[2]			Nutrient Value	
	Oil	Protein	Starch				N	P	K	2013[2]	2008-2012
%	----------%----------						------ lb/acre ------			------ $/ac ------	
0	2.7	8.4	73.4	5/31	212.5	275.8	0	0	0	$0	$0
33	2.6	8.5	73.3	5/31	211.5	275.3	40	3	28	$37	$41
67	2.5	8.6	73.4	5/31	210.0	275.5	58	4	40	$53	$59
100	2.9	8.7	72.7	5/31	209.8	274.3	87	6	52	$75	$82
Mean	2.7	8.6	73.2		7/28	275.2	46	3	30	$41	$46
C.V. (%)	9.8	1.9	0.6		0.4	0.2					
LSD 0.10	NS	NS	NS		1.0	0.8					
LSD 0.05	NS	NS	NS		1.3	0.9					

[1] Yield adjusted to 15.5% moisture.
[2] Corn stover removed spring of 2013 from 2012 corn crop.
[3] Silk date; 210 = July 28. Mature date; 276 = October 1.

Table of Contents Home page

Table 2. Corn on Corn Stover Removal - NDSU Oakes Irrigation Research site 2009-2013.

Stover Removal	Grain Yield	Harvest Moisture	Test Weight	Chlorophyll Reading	Reading NDRE	Stalk Nitrate-N	Grain Protein	Silk Date	Mature Date
%	bu/ac	%	lb/bu			ppm	%		
0	218.1	22.8	54.4	54.5	0.3669	2600	8.4	7/23	9/30
33	219.8	22.0	55.1	55.7	0.3665	3138	8.4	7/22	9/29
67	221.6	21.9	55.1	56.7	0.3676	3134	8.4	7/22	9/28
100	221.4	21.2	55.4	56.8	0.3627	3451	8.5	7/21	9/27
Mean	220.2								

Table 3. The effect of corn stover removal rates on grain yield and other agronomic parameters for corn on soybean plots in 2013.

Previous Year Stover Removal	Grain Yield[1]	Grain Yield 2009-13	Harvest Moisture	Test Weight	Chlorophyll	NDRE	Population	Fall Soil Nitrate-N	Seed			Emerge Date	Silk Date[2]	Mature Date[2]
									Oil	Protein	Starch			
%	bu/ac		%	lb/bu	6-Aug	5-Aug	plants/ac	lbs	----------%----------					
0	241.3	228.5	20.9	49.9	59.6	0.3649	31541	23	2.7	8.8	73.3	5/31	210.0	274.5
33	247.3	222.6	21.1	49.6	59.1	0.3633	32267	44	2.5	8.5	73.6	5/31	210.3	275.5
67	243.1	225.6	21.2	49.0	58.6	0.3674	30895	31	2.7	8.7	73.5	5/31	210.8	275.8
100	247.5	226.3	21.5	48.7	60.7	0.3672	32267	29	2.6	8.8	73.4	5/31	210.3	275.0
Mean	244.8		21.2	49.3	59.5	0.366	31742	31.8	2.6	8.7	73.4		210.3	275.2
C.V. (%)	2.8		2.8	1.2	6.2	1.7	2.7	58.9	9.9	2.3	0.6		0.2	0.2
LSD 0.10	NS		NS	0.8	NS	NS	NS	NS	NS	NS	NS		NS	0.5
LSD 0.05	NS		NS	NS	NS	NS	NS	NS	NS	NS	NS		NS	NS

Planting Date = May 18; Harvest Date = October 21; Previous Crop = Soybean

Fertilizer Rate lbs/acre = 300 N, 143 P_2O_5, 95 K_2O; 50 S, Zn 3; Irrigation = 13.9 inches.

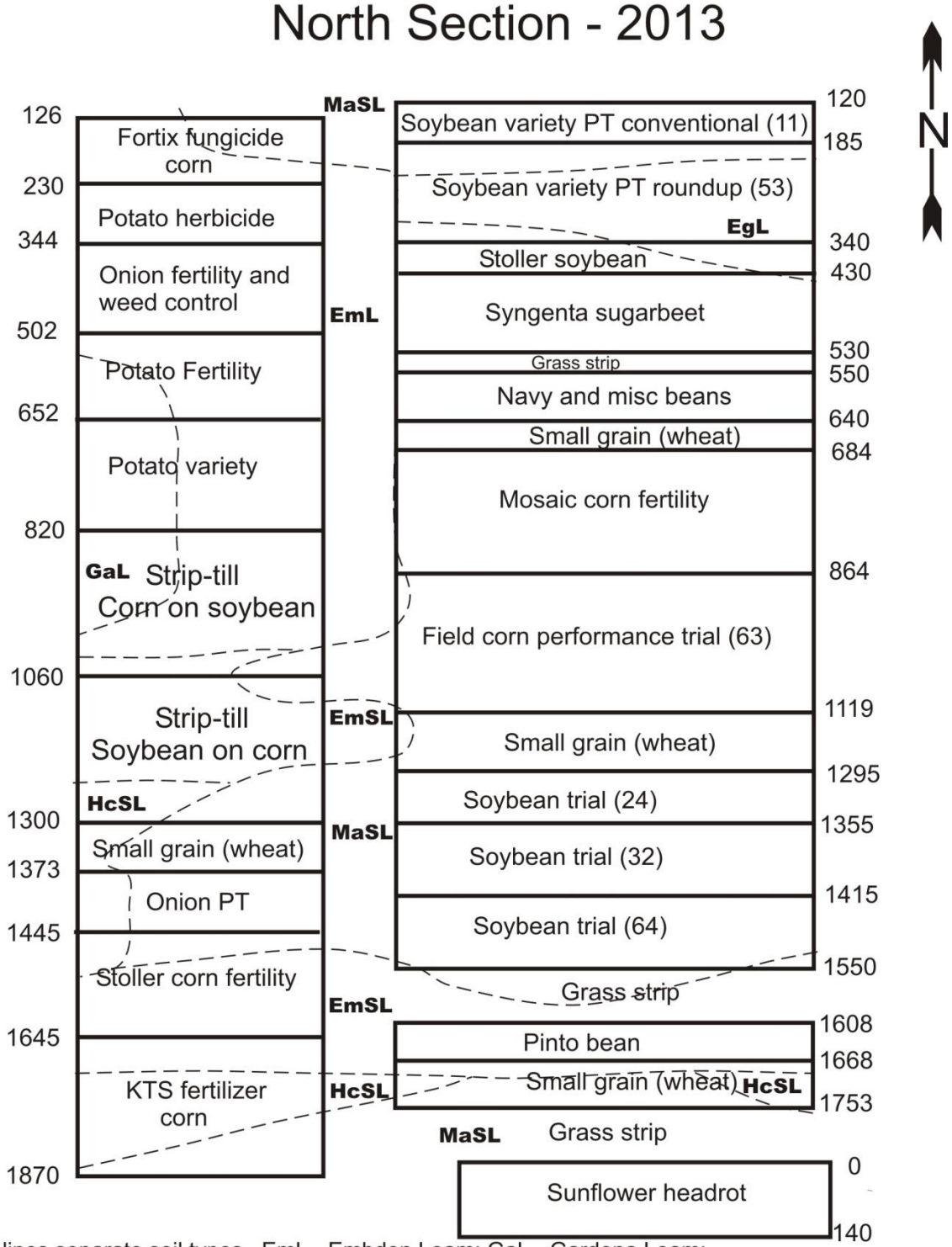
[1] Yield adjusted to 15.5% moisture.

[2] Silk date; 210 = July 28. Mature date; 276 = October 1.

Table of Contents Home page

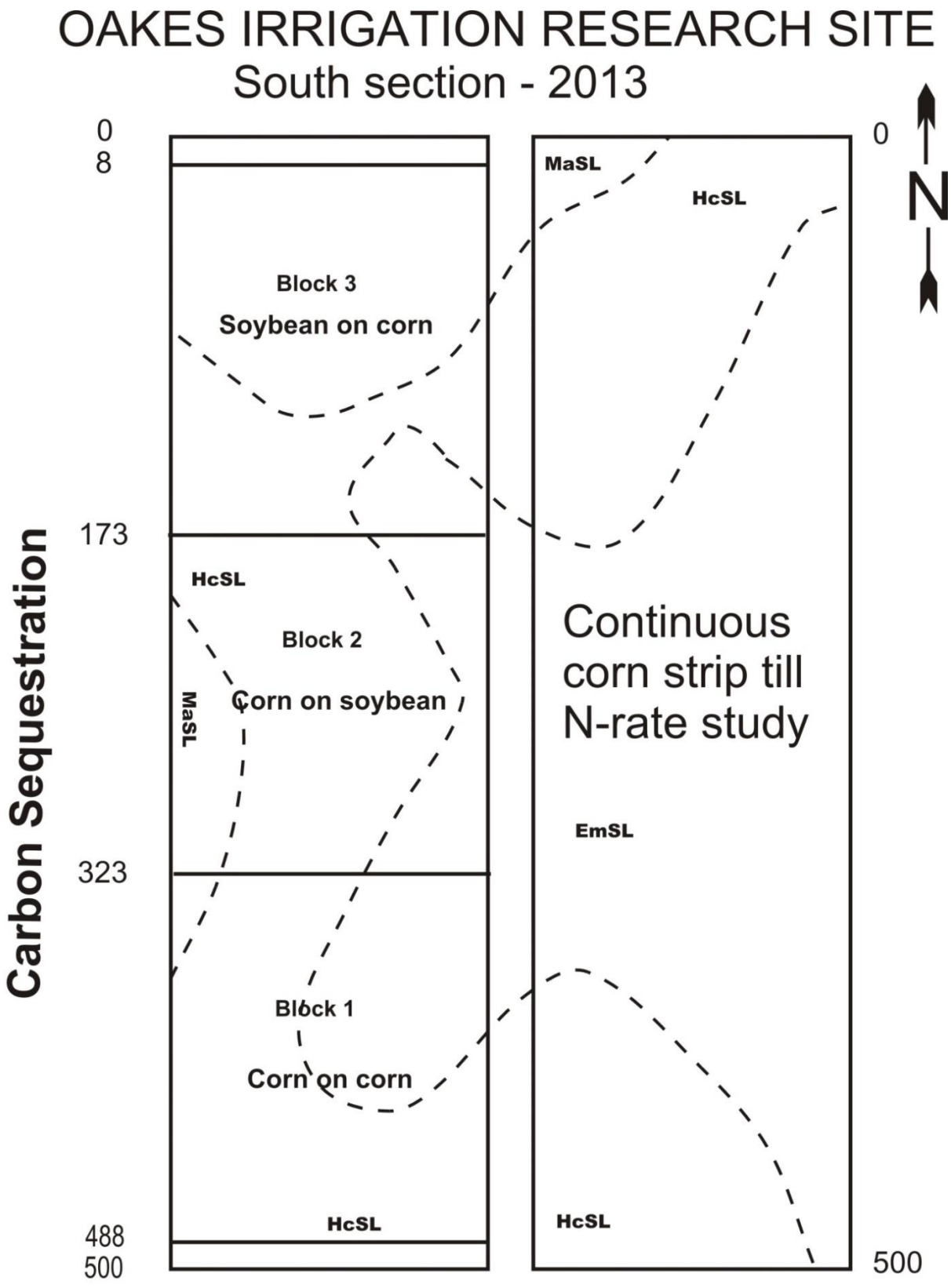
OAKES IRRIGATION RESEARCH SITE

North Section - 2013



Dashed lines separate soil types. EmL - Embden Loam; GaL - Gardena Loam; EmSL - Embden Sandy Loam; EgL - Egeland Loam; HcSL - Hecla Sandy Loam; MaSL - Maddock Sandy Loam

Table of Contents Home page



Dashed lines separate soil types. MaSL - Maddock Sandy Loam; HcSL - Hecla Sandy Loam; EmSL - Embden Sandy Loam.

Table of Contents Home page